

# SUPPLEMENT.

## The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2539.—VOL. LIV.

LONDON, SATURDAY, APRIL 19, 1884.

PRICE (WITH THE JOURNAL) SIXPENCE  
BY POST 21 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC  
—Highest Award for Effectiveness in Boring, and Economy in  
the Consumption of Air

JUBILEE EXHIBITION, 1882.  
THE PATENT

"CORNISH" ROCK DRILL.

FIRST  
SILVER  
MEDAL,  
MINING  
INSTITUTE  
OF  
CORNWALL.

FIRST  
AWARD  
BORING  
CONTEST  
DOLCOATH  
MINE,  
DECEMBER,  
1881.



Prices and particulars on application to the Manufacturers  
**HOLMAN BROTHERS,**  
CAMBORNE FOUNDRY AND ENGINE WORKS,  
CAMBORNE, CORNWALL.

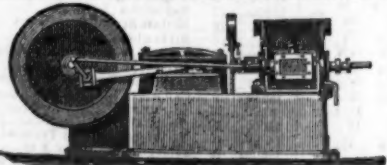
ENGINES, AIR COMPRESSORS, TUNNELLING  
CARRIAGES, TRIPPODS, &c.,  
From own design, or to order.

THE PATENT  
"ECLIPSE" ROCK-DRILL

"RELIANCE AIR-COMPRESSOR."

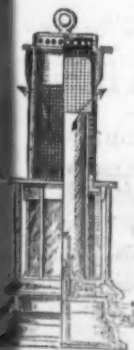
First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

PRIZE MEDAL,  
HIGHEST AWARD.



PARIS EXHIBITION,  
1878.

ARE NOW SUPPLIED TO THE  
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And are also in use in a number of the  
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WORKS IN GREAT BRITAIN AND ABROAD  
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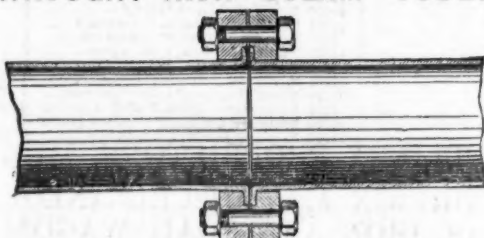
ESTABLISHED 1820.  
**JOSH. COOKE AND CO.,**  
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AND  
GAUZE MANUFACTORY,  
Honourable Mention, Paris Exhibition, 1878  
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Makers of Williamson's Double Safety Lamp,  
Williamson's Patent Double Safety Lamp shown half in  
section.  
Medal—For Improved Invention—London, Kensington, 1874.  
Ditto—Excellence of Workmanship—Wrexham, 1867.

IMPROVED PATENT  
**INGERSOLL**  
**ROCK DRILL**  
MEDALS AND HIGHEST AWARDS.

American Institute, 1872.  
American Institute, 1873.  
London International Exhibition, 1874.  
Manchester Scientific Society, 1875.  
Leeds Exhibition, 1875.  
Royal Cornwall Polytechnic, 1875.  
Rio de Janeiro Exhibition, 1875.  
Australia Brisbane Exhibition, 1876.  
Philadelphia Exhibition, 1876.  
Royal Cornwall Polytechnic, 1877.  
Mining Institute of Cornwall, 1877.  
Paris Exhibition, 1878.

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HOSKING AND BLACKWELL'S PATENT.



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fathom. They can be worked by any miner.

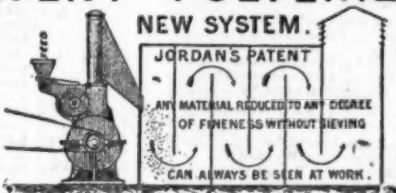
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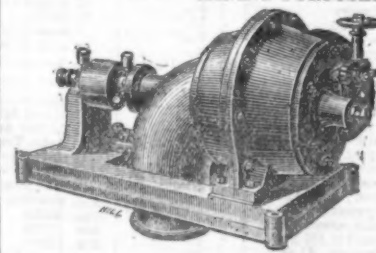
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EFFECT BY THE PATENT "TRENT" TURBINE.  
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BRIGG,  
ENGLAND.  
The Patent Trent, New  
American Hercules, &  
Victor Turbines.



FIRST AWARD.  
SYDNEY. 1879.

BICKFORD'S PATENT FUSES

FIRST AWARD.  
MELBOURNE, 1881.



FOR SIMULTANEOUS BLASTING.

SILVER MEDAL OF THE MINING INSTITUTE OF CORNWALL, TRURO, 1880,  
for an Improved Method of Simultaneous Blasting.

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**SAFETY AND INSTANTANEOUS FUSES AND IGNITERS**

FOR USE IN ALL BLASTING OPERATIONS AND SPECIALLY PREPARED FOR ANY CLIMATE

Note the **TRADE MARK**: Two Separate threads through centre of Fuse.

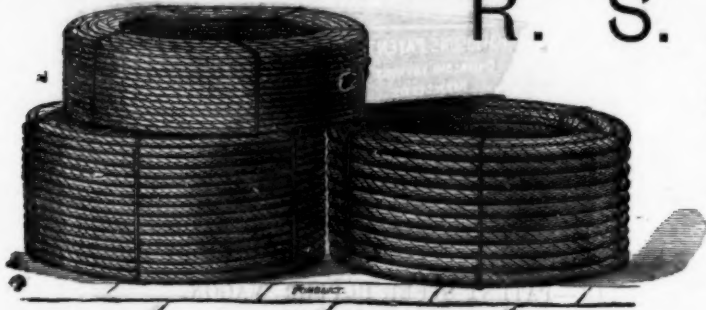
BICKFORD, SMITH AND CO.'S Patent Igniters and Instantaneous Fuses for simultaneous blasting are being extensively used at home and abroad. This improved method is the cheapest, simplest, and most dependable ever introduced for simultaneously firing any number of charges. For full particulars, see Descriptive Catalogue.

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IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.  
COPPER CABLES of high Conductivity for Electric Light and Power.

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Glasgow: 68, ANDERSTON QUAY.  
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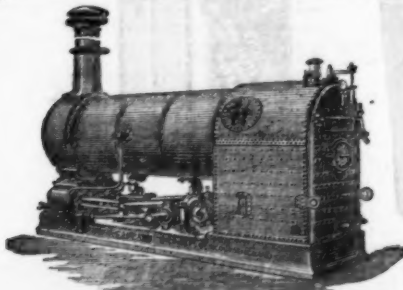
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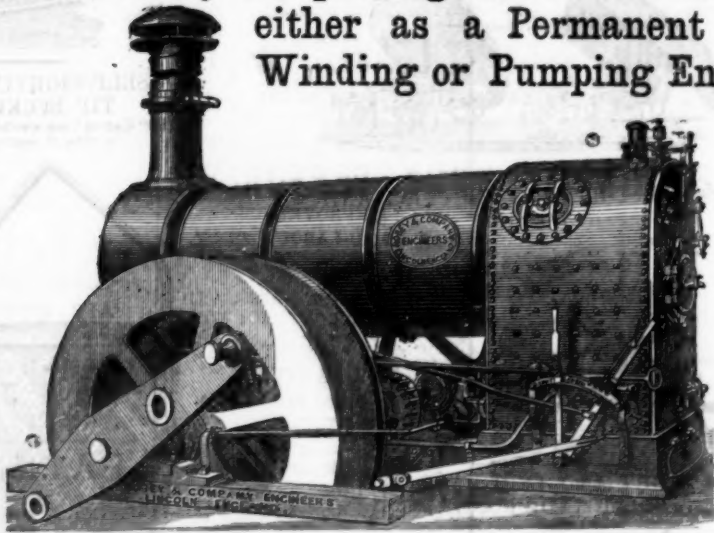


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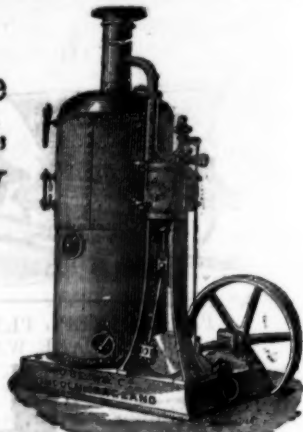


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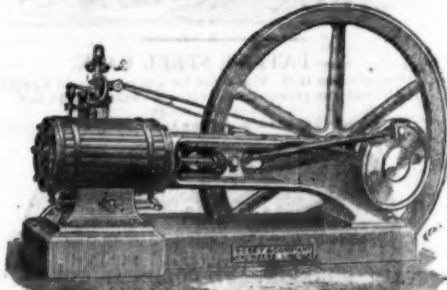
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Telephone No. 14.  
In connection with the  
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the principal Hotels and  
places of business in the  
town.

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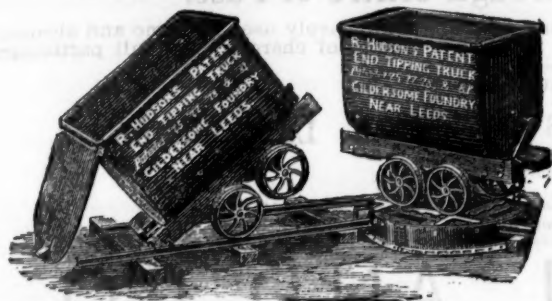
Registered  
Telegraphic Address:-  
"GILDERSOME  
LEEDS."  
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the **LIGHTEST, STRONGEST**, and most **CAPACIOUS** made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

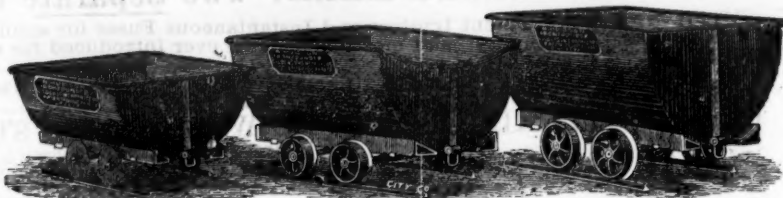
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.  
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

### CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

1.—PATENT STEEL END TIP WAGONS.



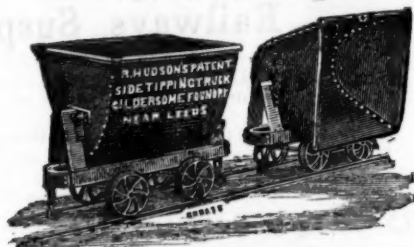
7.—PATENT STEEL MINING WAGONS.



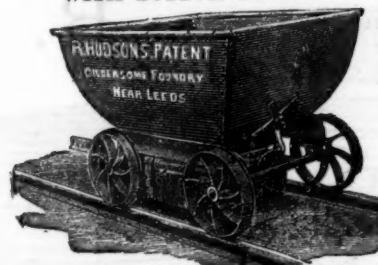
2. PATENT UNIVERSAL TRIPLE-CENTRE  
STEEL TIPPING TRUCK,  
Will tip either side or either end of rails.



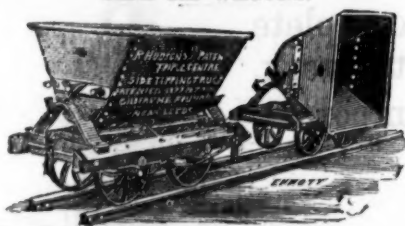
8.—PATENT DOUBLE-CENTRE STEEL  
SIDE TIP WAGONS,  
Will tip either side of Wagons.



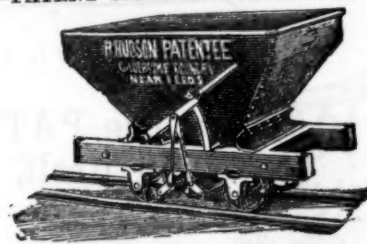
12.—PATENT STEEL HOPPER WAGON,  
WITH BOTTOM DOORS.



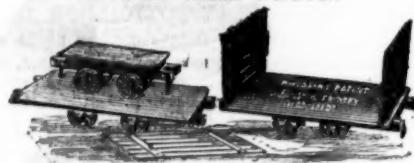
3.—PATENT TRIPLE-CENTRE STEEL  
SIDE TIP WAGONS.



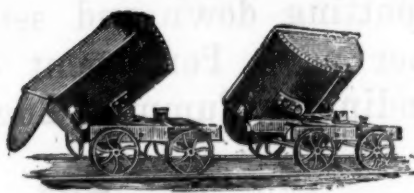
13.—PATENT STEEL HOPPER WAGON.



4.—PATENT STEEL PLATFORM OR  
SUGAR CANE WAGON.



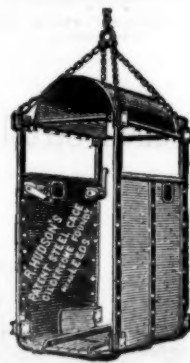
9.—PATENT STEEL ALL-ROUND TIP  
WAGON.



14.—SELF-RIGHTING STEEL  
TIP BUCKET.  
(The "CATCH" can also be made SELF-  
ACTING if desired.)



15.—STEEL CAGE.



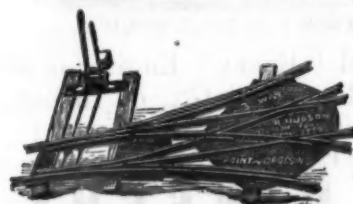
5.—PATENT STEEL CASK.  
As supplied to H.M. War Office for the late war in Egypt.  
DOUBLE the STRENGTH of ordinary Casks without any  
INCREASE in weight.  
(Made from 10 gals. capacity UPWARDS to any desired size.)



10.—LEFT-HAND STEEL POINT AND  
CROSSING.

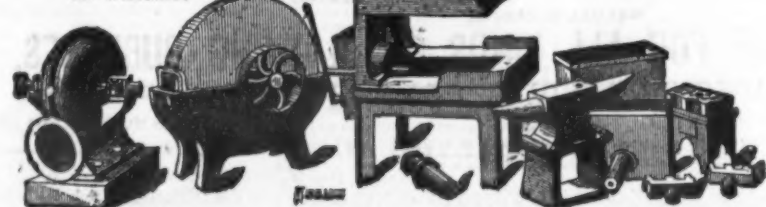


11.—RIGHT AND LEFT-HAND STEEL  
POINT AND CROSSING.



6.—ROBERT HUDSON'S  
PATENT IMPROVED IRON  
SMITH'S HEARTH,  
NO BRICKWORK REQUIRED.

A Special quality made almost entirely  
in STEEL, effecting a GREAT SAVING  
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Made to any Size.  
Lightest and Strongest in the Market.



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DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows



ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES



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**BELL'S PATENT ASBESTOS BLOCK PACKING**, for High Pressure Engines. This Packing has been specially designed to overcome the difficulties experienced by engineers and others in the practical working of engines of the most modern type of construction. The greatly increased skill and workmanship now obtained in the construction of engines and boilers have led to a rapid increase in the working pressure, the object being the attainment of a high rate of speed combined with economical working, the practical advantage of which, however, cannot be realised unless the Packings are so constructed as to avoid stoppages for the purpose of re-packing the stuffing boxes. It is now a recognised fact that the most perfect heat-resisting material suitable for the purpose of a Packing is Asbestos, but to ensure a successful application of this fibre, great skill is required in manufacture. In this Packing the Asbestos is woven into a stout cloth, and owing to the peculiar way in which it is manipulated, great elasticity is imparted to the Packing. This Packing has met with the most unqualified approval wherever it has been used, and on being taken out after about twelve months, working at 70 lb. pressure, it has been found to be in a perfect state of preservation, and was therefore replaced. The Patent Block Packing is square, as Fig. 1, and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlay. An Engineer writes as follows:—"The Asbestos Block Packing works splendidly. I have never seen its equal. We keep our gland nuts so that you can move them with finger and thumb, and can maintain a constant vacuum of 28½ in." As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears my trade mark.

**BELL'S ASBESTOS BOILER PRESERVATIVE.** This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that ¼ in. thick of incrustation causes a waste of 15 per cent. of coal; ½ in., 60 per cent.; ¾ in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

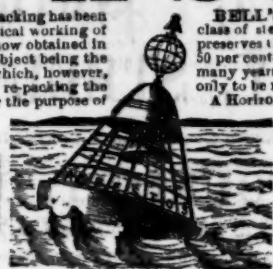
**BELL'S ASBESTOS YARN and SOAPSTONE PACKING**

for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—  
Festiniog Railway, Locomotive Superintendent's Office,  
Fortmadoc, January 13, 1883.

Mr. John Bell, 118, Southwark-street, S.E.

DEAR SIR,  
I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and answers admirably.  
Yours truly,  
(Signed) W. WILLIAMS.



The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All orders must be sent direct to the under-mentioned depots and not through Agents or Factors.

**BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION**, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.

Covering - - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonial refers to this Covering:—

Officers of the Wimbledon Local Board, Wimbledon,  
Nov. 28th, 1883.

DEAR SIR.—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering.—Yours truly,  
W. SANTO CRIMP, C.E., F.G.S.

**BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING**, for making every class of Steam and Water Joints. It can be bent by hand to the form required, without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large "still" joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from ¼ in. (Fig. 6) to 3 in. wide, and any thickness from ¼ in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles as my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

**BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD**, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-8th in. to 1 in., and ¼ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

**BELL'S ASBESTOS EXPANSION SHEETING (PATENT).**

This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials.

The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable.

This material is admirably suited to steam pipe joints and every class of valve.

Valves made of this material are very durable, as they are not subject to injury by oil.

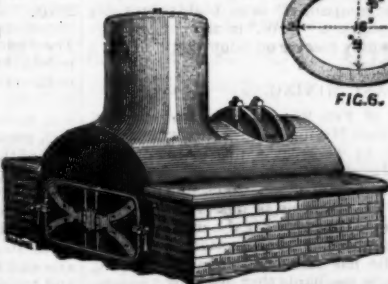


FIG. 5.



FIG. 6.



FIG. 1.

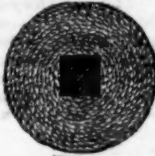


FIG. 2.



FIG. 4.

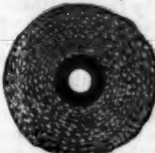


FIG. 3.

## BELL'S "ASBESTOS LUBRICANT."

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

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ALSO AWARDED GOLD MEDAL AT CALCUTTA EXHIBITION.

**BAXTER'S PATENT KNAPPING STONE BREAKER.**



1851.



FACTS SPEAK FOR THEMSELVES.



To Mr. Baxter, Leeds.

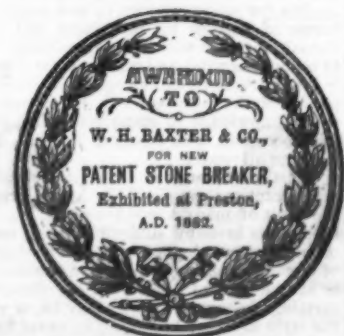
Cunderford, Feb. 13, 1883.

DEAR SIR,—I am pleased to be able to tell you that the Machine works splendidly. We are breaking 16 trucks a day now, and we thought it a good day's work to do 10 a day with the old Machine, so you can see the difference. I had a gentleman looking at it yesterday, and he was surprised to see it work so easily.  
Yours truly,  
E. ORGAN.

The above refers to one of our 16 by 9 Machines we supplied to replace an "Improved Blake" 15 by 9 Machine. Several of which have already been replaced by Baxter's.

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See *Mining Journal*, 19th January and 16th February, 1884, on THE CHEAPEST METHOD OF TREATING AURIFEROUS ALLUVIALS.

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WANTED, investors in B Syndicate, composed of 750 Shares of £10.

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By WILLIAM WETHERED.

This work is applicable to calculations where any number of articles cost is given sum, and the price of one of such number is required. The circulation of such a book as this must necessarily be limited. It is doubtful whether it will pay more than the bare cost of publishing, allowing nothing for the enormous amount of labour such a mass of figures has occasioned. The price cannot be named at less than 25s., and it is not too much to say that where it can be applied its cost will be saved in a few weeks. It will be found invaluable to accountants generally.

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## Original Correspondence.

## WEST AFRICAN GOLD MINES—NECESSARY REQUIREMENTS FOR DEVELOPING—No. I.

SIR,—As the British public have already expended a considerable amount of capital on these mines without deriving any profit from such expenditure, other than positive proof that gold actually exists, and in payable quantities if the mines are only worked on an economical system, I request that you will through the medium of your valuable Journal allow me to lay before the public my views of the necessary requirements for developing these mines, and in support of these views, and the various methods I shall propose to overcome the existing difficulties, I may state my knowledge and information is the result of 22 years' practical mining experience in Australia and America. That the gold actually exists is conclusively proved by the Gold Coast Mining Company having already produced 27000z. worth of gold, with the class of reducing appliances they have succeeded in erecting on their property at Abbotuyakoon, the Wassaw Gold Mining Company at Crockerville, and Aji Bipa, are obtaining 1 oz. per ton from the ore with similar appliances; and the French Company at Tacquah are obtaining equally favourable results with a similar class of machinery, but such returns are inadequate to pay the working expenses of the mines with the class of machinery and appliances now in use.

There are three main essential necessities that must be obtained before these mines can be made to pay—1. A road or tramway direct from Axim to Tacquah.—2. A heavy class of machinery for reducing the ore at a cost of not more than 8s. per ton, with appliances for grinding the tailings and amalgamating at a cost of 7s. per ton, making a total of 15s. per ton maximum cost.—3. Unanimity between the various companies (not only in the Tacquah district but also the companies whose properties are situated near the coast) for controlling and regulating the labour supply, or otherwise, for the introduction of a foreign class of labour, which, to judge by the present existing state of the labour market, is absolutely necessary, and will have to be arranged for, and adopted sooner or later, if these mines are to be made to pay. As I purpose dealing with each of these subjects in their order I will commence with the first—the road: During the few months I have been on the West Coast I have become pretty intimate with the country between Axim and Tacquah, and I am perfectly confident there are no difficulties to be contended with that would require any engineering skill more than what would be required running a road through ordinary broken and swampy country. I have seen the report of Mr. Thomas Barham, the surveyor that was sent out by the directors of the Wassaw Light Railway Company, and I perfectly coincide with him, that the only useful practical route is direct from Axim to Tacquah, but I cannot by any means agree with him in regard to his estimate of the cost. This country is not yet ripe for an expensive railroad, but it is absolutely necessary if the mines in the Tacquah district are ever to be made to pay, that there should be a good road, that a tramway could be laid down on and worked by mules or oxen, and I am confident such a road can be found that will not exceed 50 miles in length, working round the base of the ridges to avoid any steep gradients and treading over the swamps. The latter, undoubtedly, will be somewhat expensive, but not to any great extent, as all the timber necessary is obtainable along the side of the road, the whole route being through a dense forest. But tramways and railways are secondary considerations; the first thing is to find a good practicable road that a lorry or wagon could be drawn over by mules or oxen. To find such a road, survey it, and clear it a chain wide would not cost more than 30000z.; and as such a work is, to all intents and purposes, a national undertaking, the Government in justice ought to contribute an equal share of the cost, for the port of Axim contributes a large amount of revenue to the colony, and that revenue is derived solely from the gold mining industry. Moreover, the gold industry is entitled to some consideration from the Government, on account of the heavy tax levied on all stores and machinery—4 per cent. *ad valorem*, and an iniquitous tax of 6d. per lb. on powder, one of the staple necessities to mining.

As things exist at present, it appears to be the policy of the Government to endeavour to crush the mining industry, whereas, considering the amount of capital already introduced and expended in the colony in this industry, the Government ought, in all fairness, to remove all impediments to its development, and at once do away with the duty on mining machinery and material. The very fact that powder, which costs in England about 65z. per ton, is, by the addition of a tax of 56z. per ton, together with freightage, storing, and cost of transport to the mine, costs the various companies about 140z. per ton, is iniquitous in the extreme; and yet such is an instance of the fostering care of the Government of the colony towards the gold mining industry. At the present time it is stated there is a surplus of 98,0000z. derived from this colony; it is only fair that, as the Government taxes the mining industry to such an extent, it should spend an equivalent share of this surplus in fostering it.

After once the road is cleared, then the laying down of a tramway could be taken into consideration; but, until that is done, it is impossible to form any accurate estimate of what the cost of laying down a tramway would be, but I feel perfectly confident the maximum cost of a tramway, that could be worked by oxen or mules, and that pieces of machinery weighing 3 tons could be transported along, would not exceed 6000z. per mile. The actual distance is said to be 42 miles, but, making full allowance for the winding of the road to avoid steep gradients, it would not exceed 50 miles; that would be 30,0000z. for the whole road, and I am strongly of opinion that, when tenders come to be called for the work, it would be done for 20,0000z. Accepting the larger item as the probable cost, it would be a great saving to the mining companies, for, from information I have obtained from the managers of the various companies, fully that amount has already been expended by these companies in packing stores and machinery on men's heads at a cost of from 12z. to 25z. per ton, averaging, I am informed, fully 18z. per ton and the machinery practically useless when they have it on the mine for treating ore on a large scale and at an economical cost. With a tramway the cost would not exceed 6z. per ton, and with the advantage of being able to transport machinery such as is requisite for practically working the mines.

These facts must be patent to all persons interested, and it is the policy of these companies to work together in union to obtain this very necessary result, either by forming themselves into a consolidated company for making this tramroad, and petitioning the Government to subsidise the amount of capital they might subscribe for that purpose by an equal amount from the surplus derived from the revenue of the colony or otherwise; that the Government be petitioned to take the matter in hand altogether, and leaving an assessment rate of so much in the pound on the called-up capital of each company, and in the case of concessions held by individuals, but not floated into companies, the assessment rate be levied by valuation of the concessions, and the amount so collected subsidised by an equal amount from the surplus revenue. At the rate of 6z. per ton for carriage the tramroad ought to pay at least 8 per cent. on the invested capital, after deducting the cost of wear and tear and working expenses. In event of a system being adopted on the latter basis, the Government would make and work the tramroad, and all surplus would go to the revenue of the colony; or if the former method was adopted the consolidated company would make and work the tramroad, and divide all profits accruing therefrom. These ideas only suggest themselves to me as the basis on which this work may be accomplished; it is the method by which all such undertakings are carried out in Queensland, Australia, a young colony similar to this, with vast areas of unoccupied country. But there is this difference in Australia; all unoccupied lands are the property of the Crown, and by making a railway through any portion of unoccupied country it enhances the value of the land on each side of the road, which is at once thrown open for selection and settlement. The land of this colony, from what I can learn, was confiscated by the Crown at the close of the Ashantee war, but has never been claimed, the native chiefs and kings still retaining the land as their private property. Now, if the Government could de-

viser a method by which to acquire the right to (say) five miles on either side of this tramroad the whole length of the route, I do not for a moment doubt they would be able to advantageously dispose of this property for agricultural settlement for the production of sugar, rice, and maize, for which the greater portion is admirably adapted, the great areas of swamp being naturally paddy or rice fields, only requiring draining and cultivation to make them produce a sufficient quantity of rice to supply the demands of the colony.

Axim, West Africa, March 7.

THOS. J. HAUGHTON, M.E.,  
Mining Engineer and Assayer.

## WEST AFRICAN GOLD FIELDS.

SIR,—About the beginning of last month I wrote to you, for insertion in the Journal, a very short letter, remarking on the accounts submitted to the meeting of shareholders on Feb. 25, and especially on the extravagant sum of 18000z. inserted in the credit side of the account as "directors' fees," and I suggested, among other things, the necessity for the appointment of a committee of investigation. You did not give a place to my letter; but under the head "Notices to Correspondents" you refer to it in the following terms:—"Credulity in a single individual is sometimes desirable; but such a curious proposition could only be published over the full name and address of the writer."

I fail to see anything "curious," in that part of my proposition at least; and that it should not be so characterised is proved by the information contained in the letter of "S. W.," published in the *Mining Journal* of April 5. That the shareholders will ever recover a shilling of their money is not to be hoped for; but the exposure of the promoters and directors of a "bogus company" is so highly desirable and necessary that I will gladly support "S. W." in any proceedings which he and other shareholders may resolve on adopting.

Dunfermline, April 10.

## GOLD COAST MINING.

SIR,—In the *Mining Journal*, of Feb. 2, to hand by last steamer, there is a letter headed "Gold Coast Mining," and signed "Justine," in which Mr. "Justine" wishes to "correct a misstatement published last week, in which Mr. Haughton, who was sent out to the Gold Coast Company's mine at Abbotuyakoon, takes upon himself to say, among other things—'Mr. Gowans is deserving of great credit for what he has accomplished, not only for the manner which he has developed the mine, but also for the erection of the machinery. I am astonished that he has succeeded in accomplishing so much without the aid of a single mechanic that ever saw a quartz-crushing battery until he went out there, and even now it necessitates his being continually at the mill, for if anything goes wrong, he has no one with him that knows anything about it. I have a slight attack of fever.' I have not the slightest intention of retracting anything I have written, and for the information of 'Justine,' whoever he may be, I am not in the habit of making 'misstatements' knowingly, and in this case, from information I have gleaned here, the facts are as I have stated. Moreover, when I do attack a man through the press I never shield myself behind a *nom de plume* for fear of after results. Again, 'Justine's' attempt at facetiousness—"not to write when he has fever, as the climate has a peculiar effect on some constitutions"—I will dispense with his advice as to when I shall write, and request that he will not concern himself with regard to "climatic influences on my constitution."

My opinion is that "Justine" is some disappointed late employee of the company that Mr. Gowans considered would be a saving to the company to dispense with, and he feels aggrieved that I have not mentioned him in my report; or otherwise that he is some maliciously-disposed person interested in the company, either directly or indirectly, desirous of having a cowardly kick at Mr. Gowans, and making my letter the pretext for so doing. In any case, the man that makes an attack on another under false colours, his productions are not worthy, in my opinion, the consideration of honest sensible men. In answer to "Justine's" two points, "Mining Work" and "Engineering"—with regard to the first, Mr. Jefferies I do not know, and of his capabilities as a miner I know nothing. What I have written is from information obtained here, and, as I have said before, I do not retract a single word. Mr. Little and Mr. Davies are subordinates acting under Mr. Gowans' instructions, and have fulfilled their duties in a creditable workmanlike manner, but the credit of developing a mine is due to the manager who plans the work, and sees that it is properly carried out according to his instructions. Of the second—"Engineering"—neither Mr. Evans nor Mr. Emery will attempt to take credit to themselves for getting the machinery on the ground at Abbotuyakoon, which was the great difficulty. Secondly, I have never heard that Mr. Gowans ever attempted to set himself forward as a practical mechanical engineer. Now, if Mr. Evans or Mr. Emery individually or conjointly as practical mechanical engineers claim the credit of erecting the crushing-mill at Abbotuyakoon, and set themselves forward as understanding the erection of crushing-mills, all I have to say is that (as stated by "Justine," "the principal part of the machinery was erected during Mr. Gowans' frequent absence from the mine") if they had erected that machinery for me immediately on my return they would have got their walking ticket. I will adduce one point only as my reason, every man knows that understands anything about stamping-mills, that it is necessary the box should be so fixed with regard to the height of the cam-shaft that the whole length of the disc thread or key-way on the stamper-rod can be utilised for increasing or decreasing the length of the drop of the stamps, according as required by the nature of the ore to be crushed, whether hard or soft. This drop ranges from 6 to 14 in., the drop for ordinary ore being 9 in. to 10 in. He also knows that the dies in the box ought to be so packed that they will not be more than 1½ to 2 in. below the bottom lip of the screen discharge, otherwise the pulverised stuff cannot get a chance to escape through the screens, and the engineer when erecting a battery must make his calculations accordingly when laying down his bed logs and setting his cam-shaft. The Abbotuyakoon mill dies are screwed down to the bottom of the thread to get 4 in. drop, and that is all that can be obtained; imagine 300-lbs. stamps with 4 in. drop attempting to crush ore; the thing is impossible—they require 12 in. At present they are only chewing it, and the mischief is that it can only be remedied by taking down the whole mill to raise the bed logs, or otherwise lower the cam-shaft, and either is equal to re-erecting the mill. If "Justine" knows anything about a mill (and I doubt very much if he does) he will hardly care about claiming the credit of such a bungling piece of work as this for two practical mechanical engineers, "picked men sent out at great expense by the company, and who, I have not the slightest doubt, given full proof of their abilities in their several branches before they ever met Mr. Gowans. For Mr. Gowans making such an error I can make allowance; in the first place, the great depth of the boxes below the lip (7 in.) requiring 4 in. dies with 2 in. of packing, whereas the dies are only 2 in. might have been the cause of the miscalculation (when two dies are in the box they are too low for proper working); and, secondly, the continual worry and harass of getting his machinery and material transported from Bonsah, together with the responsibility of the mine was sufficient to occupy his mind, and consequently this important part was omitted in his instructions and escaped his observation until after the completion of the erection; but, for a practical mechanical engineer, with a knowledge of stamp-mills, engaged in erecting it, and his mind occupied with no other business, to make such an error I can make no allowance.

"Justine's" remarks that Mr. Gowans has failed to fulfil the representations set forth in his reports I acknowledge; but it is the fault of many a good man to be over sanguine, and to find themselves beset by difficulties they never anticipated, and thus oftentimes, not through any fault of their own, but through the force of circumstances, to be placed in the unpleasant position Mr. Gowans is at the present time with his directors; but of one thing I am certain, whoever "Justine" may be, or what he may be (I judge by the style in which he writes) he never had the heart and courage to undertake what Mr. Gowans undertook, when he tackled to get machinery on to Abbotuyakoon, but has just sufficient courage to stab him through the press, shielded by a *nom de plume*. In conclusion, if "Justine" wishes to have anything more to say on this subject:

let him attach his name to his opinions, otherwise I shall treat them with the contempt they merit and deserve.

Axim, West Africa, March 13.

THOS. J. HAUGHTON, M.E.,  
Mining Engineer and Assayer.

["Justine's" reply, if any, to the above must be over his own name.—ED. M. J.]

## SALT LAKE MINING INSTITUTE.

SIR,—At the request of the officers of this Institute, of which I am a trustee, I have to ask you to forward your *Mining Journal* to our reading room, though the Institute is as yet in its infancy, and has to economise. This may surprise you when you see our long list of officers and trustees, but it must be recollected that there is no country in the world that has in proportion more judges, professors, officers, &c., and less soldiers; but the fact is they killed in the late war all their soldiers, and only the officers escaped. But as to our Mining Institute I may say that we intend to have students as well as officers, and with regard to it I subjoin some extracts from a treatise by our President—Mr. J. E. Clayton, M.E.—the publication of which will be useful to us and not uninteresting to your readers. It is, he says, very important to sustain our museum in a creditable manner, so as to make it an attractive place for the study of the mineral wealth of Utah, and the Rocky Mountain region of the United States. This can only be done at present by individual subscriptions and donations of our mining communities and the liberal minded business men of Salt Lake City. At some future time the Territorial or city Government may become sufficiently liberal and intelligent to make permanent provision for sustaining it. Almost every great city in the United States and Europe either have, or are preparing to have, suitable buildings and grounds for exhibiting every important branch of their various industries and natural resources. The time will soon come when Utah will have her fair grounds and public buildings for the exhibit of her farm products, her manufacturing industries, her ores of the precious and useful metals, her coal, iron, salt, gypsum, sulphur, soda, marbles, building stones, &c., including samples of every kind of mills, furnaces, concentrators, pumps, tools, and mining equipments of every sort, used in any part of the world, thus enabling her citizens to choose intelligently the kind of implements and machinery that may be best suited to their special needs.

Our Mining Institute, continues the President, takes its ground as an educator of the people in every branch of useful industry. It proposes to collect a good library of the text-books of the mechanic arts and sciences, illustrated catalogues of all kinds of machinery and tools used in mining and other industries, and at an early day to make it a practical school of mining, where our young men can take special courses of instruction in practical mining, assaying, and all kinds of metallurgical processes, including economic geology, mineralogy, mechanical drawing, and engineering, thus making it a training school for their instruction in the practical sciences connected with the every-day business of mining in all its varied branches. Mining schools should be established in great mining centres, instead of in cities remote from the mines. Thousands of young men could take a practical course of instruction here that could not go to the mining schools in eastern cities. They could work in the mines part of the year, and during the winter months take up their course of practical instruction in the special branch of the business best suited to their interests and inclinations. These useful objects can be attained as soon as we can get material and means to work on. Then our young mining men that are driven out of the mountains by the winter snows, can put in their time to some useful purpose, instead of spending their time and money in idleness and dissipation. We want to give the boys a chance to be men, worthy the name, and make themselves useful members of society, and honourable citizens of a great country.

The history of our mining industries, he very truly says, illustrates the importance of a thorough practical training in economic geology, mineralogy, engineering, mechanics, and metallurgical chemistry. It is true that a few men have made splendid successes in mining who have not been proficient in any one of these branches of knowledge, but they have been fortunate in getting possession of mines that were rich enough to pay large profits, in spite of ignorance and bad management. Then they imagine that it is brains and energy that gave them success. Such men invariably ridicule scientific knowledge, and treat with scorn the painstaking, careful, student who produces the best machinery, the best metallurgical processes, the best tools and appliances for working mines and reducing their ores, and the best engineering skill and knowledge of economic geology for planning and directing the underground workings. Gas and cheek are poor substitutes for educated brains; sooner or later the gas is exhausted, and the inflated self-importance of the brute collapses, and only pure unadulterated cheek remains to mark the man for just what he is. The world is never benefited by the lives of such men. They add nothing to the sum of human knowledge. They mark no important step in the progress of human intelligence. They leave no work behind them by which the mass of mankind is benefited or permanently bettered in material, mental or moral progress. They die and sink out of sight and memory, for the very good reason that they have never done anything worth remembering.

The thoughtful mechanic that invents a new machine or improves an old one, the chemical student that discovers a new process that cheapens the reduction of refractory ores, the engineer that devises an improved method of getting ores or other valuable material out from places supposed to be inaccessible, the economic geologist that maps out the position and extent of the useful deposits of ores and minerals that can be made available for supplying the needs of man, are the real benefactors and educators of the race. They are the men that put thought into their work, they are the men who have made indelible marks upon every step of human progress, from the savagism to the Stone Age, and thence up to the splendid achievements of the present time. A knowledge of the mechanics, arts and sciences, applied to the various branches of productive industry, promotes the growth of individual and national wealth, and in connection with high moral training, increases the possibility of a higher and nobler civilisation than this old world has yet known.

These extracts, although comparatively brief, will suffice to give a fair idea of the President's views, and of what the Institute intends to accomplish for the mining industries of Utah, and I believe we shall obtain the necessary support to make it a great success.

Salt Lake City, March 26.

W. BREDEMAYER.

## MINING FOR THE PRECIOUS METALS—HAS IT PAID, AND DOES IT PAY?

SIR,—The grand results of gold and silver mining in the United States, and especially in the Western States and Territories, have never been fully stated by any writers on the subject, and but few men seem to comprehend its bearing and influence upon all other branches of productive industry throughout the broad domain of the Republic. The public mind is not well informed on the importance of the mining industry of this Western country, or the great influence it has had in the rapid development of the natural resources of the United States. A brief statement of what it has accomplished in the last 35 years will illustrate this. According to the best sources of information obtained by the Government this country has produced the vast sum of \$2,230,447,887 in gold and silver. This enormous sum of money has been added to the permanent wealth of the country, and given it an impetus in every branch of national growth and material progress, without a parallel in the history of any people. It has made our railroad and telegraph system spread like a net all over the great West in the last 25 years. It has opened up a vast wilderness, with its boundless resources, to settlement and civilised uses, that otherwise would have been a desolate waste for another 100 years.

The mining industries of the West have accomplished these splendid results in the face of the most adverse circumstances. Vast regions of wild country had to be explored, deserts of unknown length traversed, hostile tribes of savages had to be exterminated or subdued, trails and roads had to be cut through forests and over snowy ranges that would have appalled any but the stoutest hearts. But in defiance of all obstacles, great and small, the hardy prospectors and pioneers have explored and opened up for permanent settle-



ment an extent of country that contains 1,339,137 square miles, extending substantially from the eastern lines of Colorado and Dakota, west to the Pacific, and from the Mexican line north to the British possessions. Such a rapid conquest and growth of civilisation, over a mountainous country half as large as Europe, was never before achieved by any race of men on this earth.

From the best compiled statistics it is shown that capital, labour, and property invested in precious metal mines of this country during the past 35 years may be safely estimated at \$1,120,200,000, and the product (including the value of mines and machinery) may be safely placed at \$2,760,000,000, thus conclusively proving that under all the adverse circumstances heretofore existing, without adequate transportation, high cost of labour and supplies, and crude methods of reducing the ores, it has produced the results above stated. This shows most clearly that for every dollar put into the gold and silver mines of this country during the last 35 years more than two dollars have been taken out. This is a better showing than any other productive industry, situated under the most favourable circumstances, can make with the advantage in the favour of mining that its production remains as a permanent part of the nation's wealth and capital, and is one of the chief factors of human advancement and civilisation. This brief statement of the difficulties under which our mining industries have been established, and the splendid results accomplished show beyond question that precious metal mining does pay. But what of the future? Will mining continue to pay? Most assuredly. Our people have now substantially occupied the country, railroads are penetrating the most important mining territories, given us more rapid communication and cheaper freights, our mining men are becoming better informed and more skilful in every department of mining requirements. Mining machinery has been greatly improved, and the most refractory ores can now be successfully reduced, and low grade ores that could not be worked 10 years ago can now be worked with a fair profit. In a word the mining industry is now firmly established, and with education and experience in the practical methods of conducting mining enterprises we ought to increase our annual output of the precious metals steadily for the next 25 years at least, by which time we will probably add to the permanent wealth of the country \$2,000,000,000 more in gold and silver.

The future growth of the mining industry of the West, and the influence it will exercise in shaping the destiny of this Republic, can be estimated with approximate certainty by scanning carefully the grand results it has already accomplished. It must be remembered that the experimental stage of the industry has been substantially past. It is slowly and surely assuming regular business methods. Men of practical skill and experience in mining and metallurgy are more generally employed as managers of important enterprises than formerly. The fact is now being recognised that mining requires as much skill and practical training in its management, as any other branch of productive industry. In fact, it requires a higher order of talent, training, and good judgment to conduct a legitimate mining enterprise properly than is usually considered necessary in most other branches of business. This is especially true in the early stages of exploring a mine and testing the quality of its ores, and determining the capacity of its output in daily average tonnage of ore, and the best methods of reduction, all of which should be carefully ascertained before a permanent plant of machinery is placed on the mine, or the establishment of reduction works. Capitalists can safely engage in precious metal mining as a legitimate business, with a greater certainty of good average returns than in any branch of productive industry in this or any other country. There is a steadiness and certainty in the value produced that is unknown in any other branch of business, and it adds to the money wealth of the country in a way that no other industry can. Do the men who say "that precious metal don't pay" ever stop to think where all the gold and silver in use as money came from? Did it rain down from the air ready coined for use in the business affairs of every-day life? Is it possible that such men do not realise the fact that every dollar of silver and gold was dug out of the mines? That without mines the world would have no money, and without money there would be no railroads, no banks, no steamships, no telegraphs, no printing presses, no governments, no civilisation? Was there any civilisation before men learned to mine and work the metals? The relics of the stone age answers, no.

The history of the world abundantly proves that those races of men who learned to mine and work the metals became the masters of the world, and are to-day, and those races who had no mines, or never learned to mine and work the metals, are savages to-day. No great need exists without there being somewhere in Nature an adequate supply. We had the iron, the mechanical skill, the engineering ability, the intelligence necessary to make grand combinations for great industrial enterprises, but we did not have the capital. Then came the acquisition of California and a vast wilderness intervening then called the "great American desert," followed soon after by the discovery of gold in California. The whole nation was aroused to intense activity, and the wild rush began for the wilder regions beyond the "Rockies." The great demand of the age was granted, giving our people the capital to carry on a system of railroad building, and great industrial enterprises unprecedented in the history of man. Could this have been done without the aid of precious metal mining? Can any intelligent man trace out the past history of the race, and study the most potent factors in the great enterprises of the present, and say that precious metal mining does not pay? Can he say that the human race could have grown out of savagism, without the establishment of mining industry? Let those who sneer at mining and belittle its importance to the country give us something better than stupid assertions with no facts to sustain him.

Salt Lake City, March 15. J. E. CLAYTON.

#### PERSONAL PROFITS THE PRIMARY INCENTIVE TO MINING.

SIR,—I presume no one embarks in mining except with the view to profit thereby. Its material products are not regarded so much as to their intrinsic value and indispensable necessity in the economies of every phase of civilised life and progress as their being the medium and source of profits to the patrons and supporters, which constitute the various combinations associated ostensibly for their development and realisation. It is a well-known and equally established fact that the enterprise of mining is attended with risk—the liability to sustain loss as well as of realising profits to those engaged therein; but it is not so well or so generally known that the liability to loss is due more to extraneous conditions than to any inherent necessity practically and experimentally involved in the proper prosecution thereof. Mines that are sources of revenue and income, and others presenting appreciated prospects of becoming so in the near or more remote future command marketable values proportioned in the first instance to the revenues accruing, the stability of their resources, and the probability of their extended continuance, whether with or without increase of the output and products; and in the second instance—respecting progressive mines—the nature of the prospects, the capacity of the sources, their number and extent, the quality of the products, the quantity apprehended progressively or otherwise, the time estimated to realise them, the expense of doing so, and the pecuniary results anticipated. These constitute the several salient points which form the basis of calculations, or should do so, of the respective valuations, intrinsic and prospective, on which and from which the market rates should be regulated and governed. That there should be a market for such stocks of admitted real and prospectively estimated values is strictly right and proper in the nature of the thing itself—its business and convenience. Properly associated the market for its stocks would beneficially subserve the interests of those committed to its prosecution, and in which relation it would be subordinate to mining, and not mining to it. The merits of the respective properties—prospective, progressive, or advanced—would then be appealed to as a rule determinative of values and the market rates for sale and purchase, instead of being, as it now is, subordinate thereto and thereby. If such a regime were adopted and rigidly adhered to mining would regain its lost prestige, would advance and become popular, on the best and most indisputable basis—the basis of its profits as compared with any or every other speculative industry. The lack of its stability is now in this respect due to its subordination to ulterior ends, demoralising instead of promoting and harmonising its several interests.

The staple sources of mining are in the mines themselves, the development of which on correct business and scientific principles is the surest and safest way to its general success and the success of those who identify themselves therewith as patrons and supporters investing their capital. The best paying properties are those well-appointed juvenile concerns which contain and present the elements of metalliferous fertility in ample and appreciable form at their earliest stages, and whose progressive development thence onward, verify auguries which not only sustain, but enlarge and strengthen expectations. It would be begging the question to suggest that there is no certainty of success attaching to such enterprises, as there is the same certainty and equal in degree as attaches to any and all other enterprises—moral certainty—the highest kind next to absolute, which is and for ever will be unattainable. The measure of success not only as it respects the mines individually, but by comparison with each other, will be variable in despite of the most able supervision and direction from circumstances and conditions beyond the control of human individual efforts or of humanity combined; but that there need be failures, and the consequent losses as we know them, is much more a deplorable misfortune due to recklessness and imprudence than to the exigencies of necessity involved in the prosecution, development, and intricacy of the resources of metal-yielding mining products. A tree, we are told, is known by its fruits; and a mine, it may with equal propriety and confidence be stated, is known by its products; but it does not follow, or even admit of the inference that neither the one or the other can be known until their identity is established by the fruit they bear.

Ione, Nye County, Nevada, March 25.

ROBT. KNAPP.

#### CANADIAN MINES, RAILWAYS, AND GENERAL INFORMATION.

SIR,—I have read with great interest the letter in the *Mining Journal* of April 5 on this subject, and am pleased to see that some one has come forward to assist the development of the vast, yet unlimited, mineral resources of the dominion. Having recently returned from Canada I can thoroughly endorse all the writer says with reference to the mines situate on Canada Pacific Railway, and am confident the time is not far distant when these and many more (yet undiscovered) mines in that part of Canada will bear out the most sanguine expectations.

Mining in Canada is only in its infancy, and but for the spirit and enterprise of the Americans and English it would be less conspicuous than at present. Canadians have the means, but lack the venture and enterprise so requisite for success in mining, and unless they awake more fully to their interests and hurry up will be most certainly outstripped by the "Go or bust" or the "Never say fail" mining men of the United States and England.

Canada abounds with mining riches—gold, silver, copper, iron, manganese, phosphate, asbestos, and mica. I venture to predict that phosphate (apatite) mining will steadily increase, and become one of the least risky and most profitable mining investments. On a future occasion, with the Editor's kind permission, I will give a few particulars respecting this branch of mining industry, which may interest our readers. Considering the many difficulties which confront the miner on every hand, in the shape of distance from rail, high price of labour, and lack of mining knowledge in those employed. As most men are more conversant with farming and lumbering pursuits, and anticipating the change that will assuredly take place on the completion of various railways now in progress, which will bring in miners and speculators on every hand, and looking at the enormous outputs or produce from these new points, I was fast losing faith in the ability of British mines to compete with them, but candidly, Sir, I find such a conclusion is absurd, and in view of what I have seen during my stay in this locality must say am surprised to find that the mineral resources of this country are as much neglected and undeveloped as any in Canada.

In all my experience, extending over the past 18 to 20 years in connection with foreign and British mining, I never saw anything equal what may be seen in this locality. A few particulars may interest your readers. Nant-y-Garw Silver-Lead Mine is situate 8 miles from the Rhayader depot of the Mid-Wales Railway, and connected therewith by a good road. The lode baffles description, it runs in the lower silurian formation, has been traced for a distance of 8 miles. The operations at the mine on this lode are all at surface. The lode has been uncovered, at least the hanging portion of lode, for a distance of 60 to 70 fms., and for the whole of this length shows a solid leader, or vein of lead ore, varying from 2 to 12 in. thick; moreover, independent of this vein, which is termed the hanging vein, there is 4 to 7 ft. wide of ore ground to the footside, and on the footwall another leader of lead ore, the lode between these two veins, is crossed and recrossed by veins of lead, blende, and sulphur. The total width of the lode from foot to hangingwall is 20 to 30 ft. A more massive lode for richness or appearance it is impossible to find at such a depth. The hanging part of the lode is worked open cut (stoping), and regular monthly returns made, without the aid of machinery, by three men and two boys. The top stope as now worked is producing 25 to 30 cwt. lead ore per fm., and the deepest point worked, which is 48 to 50 fms. from last point named, produces 4 to 6 tons silver-lead ore per fathom. The vein here is 1 foot wide solid; in fact what I have seen I believe—two-thirds of the produce from this lode is simply bucked and put to bing ready for sale. What do lead miners think of this?

Wales is as badly in need of a fair trial as Canada. The country speaks for itself with such mines as the Van, Frongoch, Doliver, Pant-y-Mawr, and a host of others too numerous to mention. Then, again, this locality abounds with slate and paving stone. Here are veins of slate 30 to 40 ft. wide, all awaiting capital. Mr. Lloyd is one of the most spirited and enterprising gentlemen in this locality, and has quarries in full work, and looking well for the future. It is patent to any practical miner that there is a bright future in store for Rhayader. Certainly the price of lead is low, and cost of carriage for same, slate, paving stone, &c., quite an item, but let those who are interested in quarrying and mining in this locality take courage as also the railway company, whose iron horse traverses these beautiful valleys. Better times are coming. I feel sure that quarrying and mining difficulties will soon be met by an extension of the Mid-Wales Railway; be this as it may, this locality will not be long before it is in a position to support and maintain the reputation of profitable investments in Wales. Cymro am Beth.

W. H. PHILLIPS.

Rhayader, April 11.

#### THE PROSPECTS OF LEAD.

SIR,—The lamentable condition of lead mining, and the uninterrupted low value of that metal now for some years, have from time to time elicited many clever letters from your correspondents. In these the persistent depression is attributed to Free Trade, unfair trade, excessive royalties, foreign competition, gold mining rivalry, the general dulness of trade, lack of building speculation, and numerous other causes. But what appears to me to be the true cause is, so far as I have read, altogether ignored. It is the gradual displacement of lead by the introduction of what is incorrectly called galvanised iron, so that it is no longer wanted in large quantities in any part of the world. A few years ago hundreds of miles of lead piping were used at home, and also exported. Every large tank was of lead casting, every cistern. Now, even in roofing of buildings and gutters, it is superseded by iron at half the cost of lead. The present state of the lead market is simply a question of demand and supply. Unless some other use for lead on a considerable scale is discovered how can it ever regain its former position? Some months ago it was said to be in request for the storing of electricity, but this has come to nothing. Other lead-producing countries, especially Spain, where the silver in the lead pays the expenses of raising, can supply sufficient metal for the whole Eastern world cheaper than we can, and America supplies herself. Protection—even if that were not dead and buried beyond all recovery—would be of no permanent service. The price would rise, of course, for a short time, but the consumption would grow less, and the price would soon find its present level. I fear the lead disease is a mortal one. Being a sufferer myself from its failure, I shall gladly welcome any reasonable contradiction of what I have ventured to advance.

Over Wallop, April 14.

SAUCIUS.

#### FRONTINO AND BOLIVIA COMPANY.

SIR,—I have not the slightest wish to damage our company by making these few remarks. I am a poor medico, and was favoured with a "private prospectus" nearly 26 years ago of the above company. It promised so much for investment that I made all due enquiries, and was strongly advised to take shares. I applied for 100 shares and was told I should make a lot of money if I liked to sell at a large premium, or if I kept the shares I should have a large addition to my income. Years have rolled on. I have never sold a share; but am sorry to say I increased my holding much. Meeting after meeting has taken place, and promises after promises, as the *Mining Journal* has chronicled; but they have turned out, as the old saying is, like "pie-crusts." On looking over the old private prospectus, I read with sorrow a tissue of falsehoods nearly from the beginning to the end of it. I should like to give some quotations from it for the benefit of my fellow-shareholders, but that would make my present letter too long; I hope you will spare me space on another occasion just to give a few extracts to inform our new shareholders the enormous wealth we were promised. Alas, the caution I learned at school was thrown away upon me—"Effodiantur oves, irritamenta malorum." I have quite realised this old saying, for mines have nearly ruined me. Do any of our shareholders know what has become of the late superintendent of our mines, who gave such wonderful reports of our golden wealth, Captain William Gozen; what has also become of the vendor, who was to receive 22,000*l.* in cash and 13,000*l.* in shares, lucky dog! Are they still shareholders in our valuable property? I was informed that the 100,000*l.* capital was all taken up, but enough, I wish to return to this subject in a future letter. I am glad to hear our Chairman is going out to our mines. I hope he will take a clever man with him, who knows something about a mining property, or the results may turn out similar to sending out our gallant Col. Strange to report on the great riches we owned in the old Quebrada Company. Well, he went and returned, and told us that we had plenty of copper if we could only get it to the coast. Many like myself doubted if the poor old Colonel ever saw the mine, and the results are too well known—a wind-up and a re-christening of the company the New Quebrada. Truly, I can exclaim—"That hope long deferred maketh the heart sick." I do much wish that I could induce some clever mining brain who would write a true history of some of our mines—these two I have mentioned—and I could give the names of many more and some materials, and such a true history would be instructive and amusing to us poor sufferers, and a very valuable addition to your pages.

Whitlands, Guildford, April 17.

WM. BRADSHAW, M.D.

#### TREATING POOR COPPER ORES.

SIR,—As some slight remedy for the present depressed price of metals, permit me once more to direct attention to the importance of utilising every particle of value contained in the ore, and to describe some approved methods of obtaining marketable products from copper ores usually considered worthless. The process I refer to is what is technically known as the "wet way," and which consists in rendering the ore suitable for the subsequent parts of the process by changing (usually by calcination) such of the metals to be extracted as are not so already into a state different from that of the matrices in which they are contained, and of the impurities with which they are combined—that is to say, if the matrices be soluble the metals to be extracted must be insoluble, or at least less soluble, and if the matrices be insoluble the metals to be extracted must be soluble. Unless this difference in composition can be economically secured the process cannot be profitably carried out; it is, therefore, essential that in the first place the exact chemical composition of the ore to be operated upon should be well known, and this may readily be ascertained by sampling and analysis in the usual manner. The composition of the ore being known, it is classified according to very simple principles hereinafter described and treated according to its composition.

The apparatus used in carrying out the invention consists principally of calcining furnaces, which may be of any convenient form, tanks for separating the soluble from the insoluble ingredients, and for obtaining the metals to be extracted; and sulphur condensing chambers, and a water flue, consisting of a column 10 ft. high and 3 ft. internal diameter, having a tank at the top with a perforated bottom that there may be a continual dripping of water, such water being pumped up again as required. The whole or any of the exterior parts of the apparatus may be constructed of stone or brickwork, but the interior surfaces and all parts subjected to the action of the acids or of the acid vapours are by preference constructed of compressed steatite or other siliceous matter not acted upon by acids. The tanks may be conveniently constructed of wood. The steatite has only to be crushed fine, softened into paste, or made plastic with solution of potash, and moulded into bricks, which are afterwards annealed. These chambers are much cheaper than lead chambers. Such being the description of the apparatus there remains to be explained the mode of using it.

Before commencing to treat a given ore it must be considered, firstly, whether it is a sulphide ore or an oxide ore, and, if a sulphide ore, whether it is rich or poor in sulphur, the profitable treatment of the ore depending upon suiting the treatment to the composition of the ore. When ores of the various kinds can be obtained at the same place they can be treated to greater commercial advantage.

Firstly, suppose the ore to be a sulphide ore, containing but little copper and much iron pyrites. This will be considered an ore rich in sulphur. This ore must be broken down into lumps of from 2 to 4 in. cube, the least possible quantity of small being made in the process. This ore is charged into one of the calcining furnaces or ore ovens, the small being got rid of by carefully placing it at the top of the charge. The openings into the ore ovens from the exterior are then closed, and luted with wet clay or other suitable luting, and the oven is ready for the furnace gases to be turned into it. The furnace is charged with any fuel—Coal, Brown coal, yeast, or wood—which may be cheap in the neighbourhood of the furnace; and the fires being lighted, a gentle blast may, when there is insufficient draught without it, be supplied through tuyeres to keep a dense, smoky fire, namely, to distil destructively the coal or other fuel, rather than to burn it, in order that the largest possible quantity of gases may be obtained.

When the ignited gases commence to enter the ore oven a tuyere which opens therein is carefully opened, and the sulphur in the ore gradually vapourises and passes into the sulphur condensing apparatus; pipes are laid, from which minute jets of water are thrown to condense the sulphur, which, when deposited in sufficient quantities, may be collected and converted in the usual manner into roll sulphur or flowers of sulphur. It will be found preferable in practice to remove, as nearly as may be, the whole of the sulphur contained in the ore, as there will still be ample for the subsequent processes. The blast may be most economically produced by a small Schiele's fan driven, when no other available power exists, by a small turbine. It takes from six to 24 hours to burn off the sulphur, and, in order not to waste time, one ore oven is charged while the other is burning. The ore, after the sulphur has been extracted, is withdrawn and crushed whilst still hot (if the ore be friable, but if not it may usually be made so by cooling it suddenly by throwing it into cold water, or it may be further calcined and then crushed whilst still hot) to the size of peas, or smaller, in order to be ready for subsequent treatment.

Supposing the ore to be a poor sulphide of copper not mixed with a material quantity of another sulphide, it will be considered a sulphide ore not rich in sulphur. It is to be treated in the same way, with this exception. When the sulphur vapours reach the sulphur condensing chamber, instead of being condensed with cold water, as in the former case, steam is sent in through the pipes, the result being that sulphuric acid instead of crude impure sulphur is obtained. The ore, after the sulphur is burned off, is crushed and made ready for subsequent treatment, as in the former case. Supposing the ore to be treated to be an oxide ore—an oxide of copper, a green or blue carbonate, or a poor malachite—it will usually not require burning in the ore ovens, but may be at once crushed to the



size of peas or smaller, when it is ready for the subsequent treatment.

The subsequent treatment has next to be explained, and this also depends upon the form in which the copper exists in the ore in its prepared state. If the copper be already in the form of a soluble sulphate of copper it is at once washed out in the usual manner; but otherwise they must be treated for some days—eight or ten days usually suffices—with diluted sulphuric acid. For this purpose the oxides and sulphides may be well mixed and placed in the slate or wooden tanks (by preference wooden tanks well built in clay) and well covered with water containing about 10 per cent. of sulphuric acid. They are usually left in these tanks for a week, during which time they are very frequently stirred. The tanks may be made of the size of an ordinary room, and about 5 ft. deep; they are filled to about 3 ft. deep with the small ore and with the dilute acid to within about 6 in. of the top. At the end of the time the ore is allowed to settle, and the clear liquid is then drawn off into a similar tank to be precipitated with cast or wrought iron in the usual way, or it is treated by another process to be presently described. The residue is treated with warm acid solution, in order that any remaining copper may be made soluble. A boiler is charged either with sea water containing about 5 per cent. of sulphuric acid, or with river water containing about 5 per cent. of sulphuric acid, and after the ore has been well washed with this solution the solution is drawn off into a tank, and the copper precipitated with lime as oxide of copper.

When there are some ores capable of direct treatment for oxides and some which require treatment for sulphates it is sometimes more economic roughly to extract the oxides and mix them together with some of the crushed poor oxide ores with the solution of sulphate evaporating the mixture and carefully crushing the residue dry, but not washing, in order to render it marketable for treatment by the ordinary process of smelting.

With some descriptions of ore considerable economy in the use of acids, &c., may be effected by treating the calcined ore after it has been disintegrated by being thrown into water in an ordinary jiggling hutch and then operating upon the richer portion as if it were crude ore. In this process of jiggling the water must not be allowed to run off, but must be used over and over again, as it will often be found to contain the metals sought in solution. When the ore treated contains silver that metal will usually be obtained in solution with the copper from which it must be separated by the ordinary and well-known processes.

Windsor, N.S., March 24.

#### THE COST-BOOK SYSTEM—RELINQUISHMENT.

SIR,—I remember some time ago a controversy being carried on in the *Mining Journal* between the respective supporters of the systems of mines worked under the Cost-book rules, and those worked under the Limited Liability Act. Many may, like myself, from facts elicited during the correspondence, have been influenced in favour of the former system, and, perhaps, may have purchased an interest in mines worked under that system. I remember it was shown how easily a person could relinquish his holding—simply by giving notice and paying up his share of costs up to the end of the month in which he relinquished. I repeat I was induced to become a holder in several Cost-book mines; but when I wished to relinquish my shares I found all kinds of obstacles thrown in my way—in one case particularly so, and that in respect to a holding in West Phoenix Mine.

I wrote to the purser five months ago to the effect that there and then I relinquished my interest. He acknowledged the receipt of my letter, but informed me, mark you, that it was the custom of those who relinquished to send an agent to value the mine in company with the company's agent, and he saw no reason to depart from that custom. I wrote and told him I had two or three independent valuations of the mine by me, and saw no reasons for sending an agent. I received no reply. Last week I received a notice from him that a meeting would be held, at which a call would be made if necessary. At the bottom he coolly made a note to the effect that 20s. for last call—made some time after I relinquished—would oblige. To crown all, he deliberately asked me if I wished to relinquish my shares, because if I did I had better write him to that effect, so that he could lay it before the meeting. This was a plucky move—it could be designated otherwise, and with more justice—to try to get two calls and costs out of me after I had relinquished. I hope those who attend the meeting of shareholders next week will make a note of their agent's proceedings—if they are this, and I hope also others who are thinking of taking shares in Cost-book mines, will consider Punch's advice to those about to marry—"Don't." I apologise for trespassing upon your space; but I am sure you will see the justice of the plaint.

W. GORE.

[Your relinquishment, unless you have done anything to withdraw it, dates from the "five months since" referred to. The purser had no legal right to require you to send an agent to value, though you may have had the right to send one. The calls made since the relinquishment cannot be enforced, and a purser who refused to recognise a relinquishment in a Cost-book mine would quickly be brought to book by the Vice-Warden of the Stannaries, and would probably have to prove that he was not liable for damages for misrepresentation if he prevented relinquishment by a subterfuge. The shareholder, that is you, will have to pay your proportion of outstanding liabilities at the end of the month in which you relinquish.]

#### TRANSYLVANIAN MINES.

SIR,—From Mr. Kensington's interesting letter in last week's *Mining Journal* I gather he is somewhat in doubt as to what causes operate towards the partial abandonment of the Transylvanian gold and silver mines; and while he partly attributes this state of affairs to a supposition that the mines are worked out, he is also inclined to believe that the rebellious nature of the ores has much to do with it.

Save by repute, I know little of Austrian mines other than those of Transylvania; but of these latter, especially the mines situate in the north-western part of that province, I have had some personal experience, and can with confidence assert the fact that, so far from being worked out, the great majority of them have hardly been wrought at all. Undoubtedly in former ages a vast amount of mining was carried on here, with what success being a matter of history; still, there is as yet even in the old established mines—mines worked on by the Romans, and where their tunneling is still to be seen—little sign of exhaustion.

In the mountains to the east of Ruda, from thence to Nagy-Ag, and north again to Abrudbanya, lies a district intersected by innumerable metalliferous veins, which to this day have scarcely been touched, having been brought to light only by the peasants of the neighbourhood, whose mode of mining is of the simplest and most primitive description. I know scores of such individuals who, with a day's work in their little tunnel, will scrape out a bullock load of auriferous pyrites, take it across country to the Zalathna Smelting-works, and there dispose of it at rates varying from 10s. to 12s. per cwt. after deduction of an extortionate charge for treatment. The great hill ranges of Ferichsel, Dialaboil, and Virfu Porkurel consist almost literally of metalliferous rocks, upon which the attacks of the local miner have made but little impression. Nothing is exhausted here, the ground is nearly virgin.

Mr. Kensington's latter assumption has possibly, I think, more reason in it. Without doubt many of the ores are rebellious and require special treatment. Were these mines in England, America, or in any other country blessed with a more liberal form of Government, it is highly probable they would now have a world-wide fame; but in the Austrian Empire things are differently managed. There, politics exercise a very considerable influence on the industries in general, and if the Government thinks a particular province requires a little mild correction, she just ferments some political feeling, always ready for ferment in that corner of the world, and as a natural consequence local industries are blighted. This is the case with Transylvania. The country is suffering from the effect of past revolutions, the people—especially the once wealthy landholders—are impoverished, and capital to open up its natural industries and resources is not forthcoming. Hence there is little private enterprise, and of what profit there is the lion's share goes to the Government.

There does not exist in all Transylvania one single private smelting establishment; the Government possesses them all, and makes what is practically a monopoly, though an illegal one.

Now, as nearly all the Transylvanian gold and silver ores are such as call for special treatment, this concatenation of adverse circumstances naturally acts to the serious detriment of the mining industry, and explains, to a great extent, the reason why so many mines are lying idle. There can be no doubt that the introduction of capital, backed by intelligent labour and the employment of modern appliances, would convert this at present sleeping industry into one of great activity and high importance. In conclusion, I cannot forbear quoting from a private letter (April 10) I have just received from the Chevalier de Mayne:—"Your description of the gold fields of Hungary is far from being exaggerated—in fact, in some parts of your reports you have rather understated than otherwise the advantage to be gained by a scientific and practical mode of working the vast treasures now remaining unworked in that country, more especially in the district in which the . . . mine is situated."

The Chevalier is a gentleman who holds in France, Austria, Germany, and Russia the highest position as a mining authority. I look forward with interest to the future accounts of Hungarian experiences promised by Mr. Kensington. ROWLAND J. ATCHERLEY.

Kensington, April 14.

#### NEW COMPANIES, AND SHARE GAMBLING.

SIR,—I am pleased to see the remarks in the *Money Article* in last week's *Mining Journal* with respect to individuals investing in mines for the sole purpose of share gambling. Mining suffers more from this than any other enterprise. Mines, if good properties, hold out inducements of sufficiently large profits to pay largely for the speculation from the working of the mine pure and simple. However, when the element of share gambling is introduced those investors who get into the mines as an investment to pay them good interest for their money, and who are really the backbone of all mines, get disgusted. They see their shares knocked up and down without any cause. When they know their mine is improving they see their shares go back, and they are pestered with circulars right and left and why? Simply because a few speculators having "beared" their property, abuse the rules of the Stock Exchange and depreciate its value. It is this class of gambling speculators who thrive from the cable returns of mines, which afford but little indication of the real state of affairs.

However, so it is, and so it ever will be; and it only rests with the mining investor, who is content to take his profits in legitimate mining, to eschew all undertakings of the class likely to give rise to gambling. It is well-known that many of the mines of one particular firm, which paid large dividends, were not liked. This arose simply from the fact that that firm were content to work its mines for the purpose of paying as mines, and not for the purpose of stock-jobbing. Much of this stock-jobbing arises from vendors seeking to put off their shares on the public, and to do that they what is called make a market for them. In plain words, they initiate a gamble. Many of the vendors hold out to the world how satisfied they are with their property—that they are content to take their purchase-money in shares; but, instead of taking a moderate amount of shares, they take such an amount as will enable them still to make a profit if they sell their shares at half-price. Then the gambling element comes in, by those who make their market and get rid of the shares, putting the other half into their own pocket.

I was glad to see that in at least one company recently started the directors were cute enough to prevent the vendor from adopting this course. They obtained their capital by debentures which necessarily take priority over the vendor's shares. If his statements are not borne out then he practically gets nothing, as he will be only a partner, whilst those subscribing the money become creditors in respect of the debentures. At the same time, when the debentures are paid off the debenture-holders become partners or shareholders in the profits by reason of their being presented with fully paid up shares to the amount of their subscriptions. This plan is an excellent though not a new one, and I think will be found to work well if honestly carried out. It most undoubtedly fixes the vendor to the truth of his statement, and gives great protection to investors, as the shares, in the face of the debentures, should be absolutely unsalable.—*City, April 16.*

M. X. C.

#### MINING IN DERBYSHIRE.

SIR,—Some months ago I referred in the columns of the *Mining Journal* to a find of blende ore at the celebrated Magpie Mine, Sheldon, which at that time warranted the assumption that success was at an easy distance to the plucky and deserving adventurers, as the ore was cut in the deep adit, consequently there would be no water charges in opening it up and working; unfortunately the deposit did not equal anticipations, and the old company, Mr. Fairburn and party, who had stuck to the mine through adversity and otherwise for many years, unwillingly gave it up. Mr. Fairburn's name will ever be honourably associated with mining in Derbyshire. As stated by you in last week's *Journal*, the company has been re-formed, consisting chiefly of the old adventurers. The son of one Mr. Edward Holmes (Messrs. Holmes and Johnson, surveyors) is the secretary, and nothing will be wanting on his part to make the undertaking remunerative. The present object of the company is to cut a side Rake vein, which in the former working yielded immense profits by a cross-cut from the deep adit, which is 92 fms. from surface. When they succeed in doing so, Magpie will regain some of the lustre it has lost in recent years. The water charges, which are the most serious item in Derbyshire mining, below the 92, upon the erection of a turbine at this point in the old Magpie shaft will be removed, as there are several strong springs of water in the shaft which can be taken up and utilised. The old pipe can then be reworked, and even at the present low price of lead should leave a fair margin for profit.

Turbines may be used in other Derbyshire mines, which, with the adoption of continuous jiggling, lead mining may still prove a profitable industry, as in some of the veins I am personally acquainted with, keep them clear of water, and it is simply a matter of quarrying the lead out. The Peak Forest Mine, owned by some of the large manufacturers of Sheffield, for the present is dormant, awaiting a better price for lead to erect more powerful machinery for pumping, is an exceedingly rich property. The principal vein is a Rake, and can be traced on the surface for a distance of seven miles. Another serious item in Derbyshire mining, which is now being forced to the front, is that of the dues, the injustice of which my next letter will touch upon.—*Sheffield, April 17.*

W. NIXESS.

#### HOW TO PROFIT BY MINING.

SIR,—I am pleased to see you are opening the columns of the *Mining Journal* to a discussion on the rich mines of Mexico. Anything that brings before the public the advantages of legitimate mining deserves support. No enterprise has produced greater fortunes in so short a time as mining. The public as usual have been running after will-o'-the-wisps in mines, and casting aside those rich districts which have proved their stability before the world. Hitherto you had only to tell the public that rich mines existed in some out of the way spot, and they all rushed madly to put in their money, where in many companies if the copper existed in penny pieces, and the silver and gold in pure coin, it would not pay to bring them to England.

Mining, like every other industry, requires judgment and care. The people who invested their money in Indian gold mines were for the most part those who knew nothing whatever about a mine, or its mode of working, or else those who went in to gamble in the price of shares. Experienced miners in the midst of the Indian gold fever looked on and smiled. They saw there was nothing to warrant the huge prices given for the shares, but the public would have them, and whenever the public are prepared to give three times the value of an article the supply will always equal the demand. Many of those people who thus went in without care or judgment now close their pockets to all legitimate enterprise instead of blaming their own folly.

There are certain districts in the world proved to be rich by actual

production of metal. For instance, the Straits Tin, Brazilian Gold, Peruvian and Mexican Silver, English Iron and Coal. In all these cases the stability of the various districts is proved by the continuance and steady returns of the various metals. Mining in these districts is like investing your money in a legitimate business established for centuries. Mexican mining is being brought to the fore. I believe there is a great future in store. It is undoubtedly the richest country in the world for not only silver, but other metals. It is well known amongst miners how hitherto machinery had to be taken out to the mines there in pieces, each piece not weighing more than a mule load.

It is earnestly to be hoped that some of these Mexican mines now before the public will turn out successful, when a revulsion of feeling will take place, and capital will be forthcoming again for mining. At any rate, now is the time to go into Mexican mines before the public have been educated to the huge fortunes which have been made in that country from its mines. It is people who go in whenever a thing is low who make money by mining, not those who purchase when everybody else is purchasing; that is the time to sell.

North Kensington, April 17.

C. G. S.

#### PROSPECTS OF CORNISH MINING.

SIR,—The present position of many mines compares favourably with some of those of the spring of 1879, which the hardened state of the metal market brought to the fore, and rose rapidly in value, ranging from 100 to 1000 per cent., ultimately becoming permanently established dividend mines. Dolcoath and East Pool were then of the aggregate value of 166,000*l.*, while they now represent the sum of 620,000*l.*, or a rise (to say nothing of the divided profits in the meantime) of something like 400 per cent. During the late depression it has been interesting to watch the progress of some few mines, which, through perseverance and well-directed outlay, are now arrived to the position comparing favourably with those alluded to, and placing within the reach of the enterprising investor success measured only by the amount of capital invested.

St. Day, Scourier, April 17.

CHAS. BAWDEN.

#### DEER PARK MINE.

SIR,—The explorations in this property so far have opened up a lode which promises to add a rich mine to this neighbourhood. Deer Park is situated on the Cornish side of the River Tamar in a line with and eight miles east of South Caradon, 1½ mile west of Devon Great Consols, and nine miles west of Old Wheel Friendship. The lode has a dip or underlie north of about 66°, and the course from east to west is identical with the lodes of the richest mines to the east—10° north of east and south of west. At the north-east part of the mine which impinges on the southern shore of the River Tamar the hill rises abruptly at an angle of 40°, and speedily gains 40 fathoms above the deep adit. After the height of 40 fathoms is reached the ground trends gradually upwards to the south for half a mile till we find ourselves at an altitude of 90 fathoms, or 540 ft., above the river, and not far from the Minerals Railway, and the junction of the killas and granite. The lode is 4 to 6 ft. thick in the deep adit, and is producing about 2 tons copper ore per fathom, the ore part of it being 18 in. wide, and improves every fathom driving towards the grand east cross-course. In the valley which divides the manor of Stoke Climsland from the manor of Calstock, a good stream of water drains the hills, and flowing northwards empties itself at the north-east corner into the River Tamar. This rivulet gives an average yield throughout the year of 2,500,000 gallons of water per diem with a height of 75 ft., which can be utilised for machinery, dressing ores, &c.—*City, April 16.*

B. E.

#### PAR TIN MINE, NEAR WHEEL ELIZA, ST. AUSTELL.

SIR,—This mine has been inspected by Capt. R. Southey, of Wheal Jane and other mines. An adit level has been driven east on the course of the lode for 130 fathoms on the Old Par Consols lode, and the lode is found to be from 4 to 9 ft. wide, and rich for tin throughout; and in the present end the lode has a splendid appearance. A winze is now sinking below the adit, and the lode here is 10 ft. wide, and samples taken from the lode in the winze by Capt. Southey yielded 1 cwt. 2 qrs. of tin per ton of lodestuff. Capt. Southey says it is the finest lode he ever saw. It is generally thought that this mine will be found to be equal to the Old Par Mine, which paid over 250,000*l.* in dividends. The company is limited, and a new engine-shaft is to be at once commenced, and engine, stamps, &c., erected. It is worthy of remark that this rich lode is the same that yielded such large quantities of tin in the Old Par Mine. There are other lodes in this sett, one called Powder lode has been opened rich. Capt. Parkyn can now be congratulated on this rich lode, he having stuck to it and has put in a large sum in driving and opening the mine, and always said it would be found a rich mine.

R. J.

Roche, April 19.

#### LEAD HILLS

SIR,—I suggested some improvements which might benefit this company; and in continuation it appears to me that instead of troubling Lord Hopetoun for a reduction of the rent they should get an extension of their present lease for 30 years on the same terms. I would also recommend that the Duke of Buccleuch be approached to see if he would not grant a lease of his Wanlockhead Mines to the company. These mines, which march with Leadhills, belong to the Duke of Buccleuch, whose father (the late duke) expended a large sum of money on them, and I fear has not a great return for it.

The Duke is not a needy man, and might extend the payments for the plant over a term of years. At all events, the two proposals are worth trying. The mines are in reality one mine, and could be looked after by the same management, and if held by one company many improvements could be effected. I have suggested that the company should obtain the lease—not a syndicate, who would "grab" the mine with the view of selling it again to them, as was done in the present instance.—*Glasgow, April 16.*

R. T. M.

AUSTRALIAN EARNINGS.—The earning power of the Australian community is greater than that of any other population in the world. According to Mr. G. Mullhall, F.R.S., the annual earnings per head in Australia are over 43*l.*, as against 35*l.* in the United Kingdom, 27*l.* in the United States, 26*l.* in Canada and Holland, and 25*l.* in France. The rate of wages is highest in New South Wales, where it exceeds 50*l.* per head per annum. This causes the saving power of Australia to largely exceed that of other countries, the annual savings per head being—in Australia 6*l.* 15*s.*, while in the United Kingdom it is 4*l.* 4*s.*, in the United States 3*l.* 17*s.*, in France 3*l.* 13*s.*, in Canada 3*l.* 3*s.*, and in Holland 2*l.* 2*s.*

MINING PROFITS.—The capital of the Tharsis Sulphur and Copper Company is 1,300,000*l.*; and in the directors' report, of which abstract is given in to-day's *Mining Journal*, it is shown that in the 17 years ended Dec. 31 last the profits earned amounted to 4,771,148*l.*, showing an average of 263,009*l.* per annum, or a little over 20 per cent. per annum; and there is every prospect of this rate of profit being increased rather than otherwise—indeed, the dividend has not been as low as 20 per cent. since 1879, the dividends paid in 1880 and 1881 having each been 25 per cent. per annum, while those for 1882 and 1883 were each 27½ per cent. per annum. The report to be presented at the meeting on Wednesday next is, moreover, highly encouraging.

COAL MINING IN NEW SOUTH WALES.—There were 39 coal mines in operation in New South Wales during the year 1882. The total output was 2,109,282 tons, valued at 948,965*l.* The total number of hands employed was 4647. The produce from the Northern coal fields amounted to 1,569,517 tons, the average price per ton being about 9*s.* 1½*d.* The quantity raised from the Southern and Western fields was 539,765, of the value of 233,023*l.*, which gives an average of 8*s.* 7½*d.* per ton.

INTERNATIONAL HEALTH EXHIBITION.—His Royal Highness the Duke of Cambridge, K.G., has consented to open this Exhibition, on behalf of the President, His Royal Highness the Prince of Wales, on Thursday, May 8, at noon.



## Registration of New Companies.

The following joint-stock companies have been duly registered:—

**THE BATHS FOUNDERS' COMPANY (Limited).**—Capital 10,000*l.*, in shares of 10*l.*. To purchase and carry on a business of a bath and stove-plate manufacturer, iron and brass founder, established at Rotherham. The subscribers (who take one share each) are—D. G. Davy, Sheffield; D. Davy, Sheffield; F. S. H. Wilson, Sheffield; A. N. Wilson, Sheffield; C. Cooper, Sheffield; A. M. Wilson, Sheffield; J. Wilson, Sheffield.

**JOHN ARTHUR AND COMPANY (Limited).**—Capital 25,000*l.*, in shares of 10*l.*. To purchase and continue a long-established banking, commission agent, and wine merchant's business in Paris. The subscribers (who take one share each) are—E. Isaakides, Paris; D. Isaakides, Paris; F. du Bouchet, Paris; F. A. Mori, Paris; O. Frings, Paris; W. Schwartz, Paris; J. Chauncy, Paris.

**THE GLYNHOMBY SLATE QUARRY COMPANY (Limited).**—Capital 25,000*l.*, in shares of 1*l.*. To acquire the leasehold interest of the Glynhomby Slate Company (Limited) in certain slate beds or quarries, and the plant, machinery, stores, tools, &c., and to work and develop said slate beds or quarries. The subscribers (who take one share each) are—W. W. Cragg, Grays; E. E. Dyson, 6, Mason-square; H. Milton, 2, Temple Gardens; J. Beddow, 2, Gresham Buildings; F. Beddow, 2, Gresham Buildings; C. J. Evans, Peckham; J. H. Crofts, 1, Finch-lane.

**THE CARDIFF RHONDDA COLLIERY COMPANY (Limited).**—Capital 150,000*l.*, in shares of 100*l.*. The general business of colliery proprietors, merchants, shipbrokers, coke, gas, and patent fuel manufacturers, miners, smelters, ironmasters, ironfounders, and brick and tile, terra cotta and drain-pipe manufacturers, respectively, in all or any of their branches. The subscribers (who take one share each) are—R. Cory, Cardiff, colliery owner; P. Morel, Cardiff, ship owner; J. H. Wilson, Cardiff, ship owner; W. Adams, Cardiff, C.B.; J. R. Cobb, Brecon, solicitor; V. Traves, Cardiff, merchant; A. Thomas, Cardiff, lime burner. The following compose the first board of direction:—Messrs. R. Cory, V. Traves, and P. Morel. The number of directors must not be less than three, or more than nine. Qualification 10 shares.

**THE QUARELLA STONES QUARRIES (Limited).**—Capital 25,000*l.*, in shares of 1*l.*. To purchase a certain property situated in the parish of Coity, Glamorganshire, and carry on a business in connection therewith. The subscribers (who take one share each) are—C. Barker, 37, Gracechurch-street; G. Pottinger, St. John's; W. T. Taylor, Tunbridge Wells; A. H. Day, 79, St. Mark-square; J. W. Robinson, Temple; H. E. Pollard, 14, Duke-street; T. F. Charlton, 78, Upper Gloucester-place.

**THE LAUREL BANK ROOM AND POWER COMPANY (Limited).**—Capital 20,000*l.*, in shares of 5*l.*. The business of spinning, weaving, manufacturing, or dealing in cotton, woollen, and other fibrous substances. The subscribers (who take one share each) are—J. Thompson, Burnley; T. Hargreaves, Burnley; W. Roberts, Nelson; J. Sunderland, Nelson; H. Haworth, Nelson; W. Astley, Nelson; H. Fletcher, Nelson; E. Jones, Burnley; H. Greenwood, Colne.

**THE MIDLAND PRESS (Limited).**—Capital 30,000*l.*, in shares of 1*l.*. To print and publish in Wolverhampton and the Midland counties journals advocating Conservative principles. The subscribers are T. Thorneycroft, Tettenhall, 100; A. Hickman, Wolverhampton, 500; F. Gough, Wolverhampton, 250; T. Flemonger, Wolverhampton, 125; C. A. Manster, Wolverhampton, 500; J. E. Underhill, Wolverhampton, 100; F. Sollom, Wolverhampton; C. A. Newnham, Wolverhampton, 100; F. E. Manby, Wolverhampton, 100; C. H. Crane, Wolverhampton, 250; C. Wells, Wolverhampton, 500; T. V. Jackson, Wolverhampton, 200; J. Marston, Wolverhampton, 100.

**THE DUFFON FELL LEAD ORE AND BARYTES COMPANY (Limited).**—Capital 10,000*l.*, in shares of 1*l.*. To purchase for the residue of the term of 21 years the mines, veins of lead, barytes, ironstone, clay, and coal under certain lands situated in the parish of Dufton, county of Westmoreland, and the rights and privileges relating thereto, for the purpose of developing the property and carrying on all operations of a lead mining company in their various branches. The subscribers (who take five shares each) are—W. H. Gibson, South Shields; E. Swainston, South Shields; W. Williams, Brough; A. Bell, Brough; G. Atkinson, Wark; T. Martin, Brough; A. Bell, Dufton.

**THE BRITISH MORTGAGE COMPANY OF TEXAS (Limited).**—Capital 500,000*l.*, in shares of 5*l.*. The investment or advancement of money on the security by first mortgage on property of any description and tenure in the United States or Canada. The subscribers (who take one share each) are—J. D. Peddie, Edinburgh; C. F. Mackintosh, 5, Clarges-street; J. G. B. Browning, 49, Brook-street; D. Macpherson, 58, Lombard-street; H. Robertson, 85, Holland Park; G. B. Loving, Langham Hotel; W. H. Ruban, 3, Amen-place.

**THE NORTH SHIELDS AND DISTRICT TRAMWAYS COMPANY (Limited).**—Capital 50,000*l.*, in shares of 5*l.*. To construct, lay down, equip, maintain, and work a system of tramways in that part of Northumberland. The subscribers (who take one share each) are—L. Bell, South Shields; A. Cohen, Newcastle-on-Tyne; W. Bell, 130, Great Suffolk-street; J. A. Bayley, 120, Cannon-street; J. F. Cohen, 30, Great St. Helens; A. G. S. Clayton, Upper Holloway; F. C. Dixon, 55, Lee Park.

**THE DINAS STEAM COLLIERY COMPANY (Limited).**—Capital 75,000*l.*, in shares of 100*l.*. The usual businesses of ironmasters, colliery proprietors, coke manufacturers, miners, smelters, engineers, steel converters, and ironfounders, in all their respective branches. The subscribers (who take one share each) are—L. Wood, Penarth; E. Bregeon, Cardiff; L. Gueret, Cardiff; E. Thomas, Pontypridd; D. Thomas, Rhondda; H. Thomas, Rhondda; T. B. Thompson, Cardiff; J. K. Christie, Cardiff.

**THE STANDARD LEAD MINE** is re-registered, and becomes incorporated under the Limited Companies Liability Act.

**THE FLEUSCH BREATHING-DRESS AND SAFETY-LAMP COMPANY (Limited).**—Capital 15,000*l.*, in shares of 1*l.*. To acquire, work, and put into operation certain inventions connected with divers, firemen, colliers, &c., and to enable them to carry on operations without any extraneous aid. The subscribers (who take one share each) are—J. T. Rickman, 17, St. Bride-street; F. B. Duff, 110, Cannon-street; G. H. Remicker, 14, St. James's-square; H. M. Thompson, 32, Regent-street; G. O. Saunders, 1, Long-acre; E. J. Tittock, Catford; C. C. F. Emmott, 11, Jermyn-street.

**AUSTRALIAN GUM ACCROIDES.**—At the recent Amsterdam Exhibition was shown some resin obtained from *Xanthorrhoea hastata* called gum accroides, a native tree of New South Wales. The gum shown was a good marketable sample, worth in Sydney 24*l.* per ton; a few months ago it was sold in London at auction sale of gums at more than double that price. The quantity collected during 1882 was over 100 tons; this quantity is very largely in excess of former years. The resin is used in the manufacture of picric acid by dissolving the gum (or rather we should say resin) in strong nitric acid, violent frothing takes place, red vapours are given off, and a dark red solution is formed, which becomes deep yellow after boiling. This solution is evaporated over the water bath, and the remaining yellow crystalline mass, together with picric acid, contains small quantities of oxalic and nitro-benzoic acids. It is then neutralised with potash, and the picrate of potassium is purified by two crystallisations, and then treated with hydrochloric acid, which separates the picric acid, to be again purified by two crystallisations. The amount of picric acid thus formed is about half the weight of the gum to be used in its manufacture. An excellent spirit varnish is made from this gum by adding to about one gallon methylated spirit (cold), about 2*lb.* gum, about 1*lb.* common resin, and about 1*lb.* shellac, then strain through muslin cloth. This varnish must be used upon dry work, and is easily applied to our climate; if found not to answer in cold or damp climates, we would suggest it should be tried in a warm dry room. The gum is used for staining wood, and also in the manufacture of sealing-wax, brass lacquer, and Japan gold size.

## FOREIGN MINING AND METALLURGY.

Business continues to be done at very low rates in the French Iron Trade. The Orleans Railway Company has ordered 180 trucks from the Saint-Etienne Workshops Company. Orders have also been given out for 1000 tons of plates required for four gunboats. The French General Transatlantic Company has let contracts to the Forges et Chantiers de la Méditerranée for two large steamers intended to run at a high rate of speed between Havre and New York. The company proposes to give out orders for two similar steamers. Contracts for wheels have been let by the Orleans and the Western of France Railway Companies. The Bilbao Blast-furnaces and Iron-works Company realised last year a profit of 12,299*l.*, or nearly 11 per cent. upon the paid-up capital. The larger industrial companies of Germany are beginning to obtain a little more work, but many of the smaller establishments are far from having their order-books filled, and the general tone of prices has been effected to some extent in consequence. So long as the existing labour prevails quotations will, no doubt, be maintained at their existing level. Bessemer pig has made 2*l.* 15*s.* per ton in Westphalia. Bars have made 6*l.* 15*s.* per ton, while boiler-plates have been quoted at 8*l.* 10*s.* per ton. The Dahlbusch Collieries Company has announced a dividend of 1*l.* 4*s.* per share for 1883. The Maximilian Shutte Forges Company will pay, May 1, a dividend of 5*l.* per share.

In the Belgian Iron Trade orders have, unfortunately, continued scarce, the requirements of consumption remaining unimportant. Work is certainly abundant enough to keep the works generally going, but prices are extremely low, and industrialists are generally discontented with the aspect of affairs. Stocks of pig have especially become important, and a further reduction in production is beginning to be talked of as necessary and desirable. Quotations are, for the most part, only feebly maintained, while for certain products they are absolutely nominal. English casting pig has made about 2*l.* 3*s.* 6*d.* per ton upon the Belgian market. No. 1 iron has continued to be quoted at 4*l.* 16*s.* per ton, while No. 2 has brought 5*l.* 2*s.* per ton, and No. 3 5*l.* 8*s.* per ton. The current quotation for No. 2 plates has been 8*l.* 6*s.* per ton; for No. 3, 7*l.* 2*s.* per ton; and for No. 4, 10*l.* 6*s.* per ton. The question of vicinal—or small local—railways is occupying the attention of Belgian industrialists to a large extent; the applications which have been lodged for concessions are already very numerous. The imports of iron minerals into Belgium in the first two months this year amounted to 243,999 tons, as compared with 240,612 tons in the corresponding period of 1883. The exports of iron minerals from Belgium in the first two months of this year were 36,757 tons, as compared with 78,027 tons in the corresponding period of 1883. The exports of steel rails from Belgium in the first two months of this year were 1274 tons, as compared with 24 tons in the corresponding period of 1883.

The Belgian Coal Trade remains in much the same state, although coal for metallurgical purposes has been in no great request. The Anzin strike imparted a firm tone to quotations, which has not yet disappeared. The demand for household coal has been inactive; but this is, of course, only what might be expected at this season of the year. The imports of coal into Belgium in the first two months of this year amounted to 195,239 tons, as compared with 179,532 tons in the corresponding period of 1883. In these totals English coal figured for 39,414 tons and 41,414 tons respectively. The imports of coke into Belgium in the first two months of this year were 8806 tons, as compared with 3030 tons in the corresponding period of 1883. The exports of coal from Belgium to Feb. 29 this year were 673,413 tons, as compared with 629,976 tons in the corresponding period of 1883. In these totals the exports to France figured for 635,741 tons and 590,035 tons respectively. The exports of coke from Belgium to Feb. 29 this year were 142,749 tons, as compared with 189,161 tons in the corresponding period of 1883, showing a rather marked contraction this year. The general aspect of the German coal trade has slightly improved. The demand has become a little more active, and some advance in prices is even anticipated. The daily movement of coal over the railways accommodating the basin of the Ruhr was 75,870 tons in the second half of March, as compared with 76,590 tons in the corresponding period of 1883. The movement increased, however, in the second half of March this year, as compared with the first half of the month.

**VALUE OF PROPERTY IN NEW SOUTH WALES.**—The Sydney Morning Herald roughly estimates the value of property in New South Wales as follows:—City property, 10,000,000*l.*; suburban and country municipal property, 30,000,000*l.*; alienated lands and improvements, 57,600,000*l.*; free selections and improvements, 23,800,000*l.*; improvements on Crown Lands held under lease, 51,410,342*l.*; stock, 19,234,276*l.*; merchandise, 8,000,000*l.*; capital and revenues of banks, 7,712,000*l.*; bank deposits, 23,000,000*l.*; share capital, 1,000,000*l.*; ships and steam vessels, 2,000,000*l.*; total, 263,756,618*l.*. This, however, is manifestly an under-estimate, the real total being about 300,000,000*l.*; not bad for a young country which has not yet reached the centenary year of its existence.

**BRAZILIAN MINES AND RAILWAYS.**—The necessity for transport facilities in order to permit of the profitable working of mines is clearly pointed out in a recent report of Mr. Consul RICKERS, of Rio de Janeiro. He states that since the year 1830 no less than 677 privileges have been granted for inventions or improvements on inventions either having originated in or been introduced into this country. During the year 1882 no less than 73 concessions were given for the exploration of gold, silver, iron, coal, and copper mines in the provinces of Minas, Rio de Janeiro, St. Catherine, St. Paulo, Maranhão, and Matto Grosso. Brazil abounds with great mineral wealth, but gold, it must be remembered, may even become a dear production in a country where wages are high, labour uncertain, and communication difficult. Large sums have at times been buried in many of these provinces, in the expectation of great and rapid returns; but how few of these schemes have brought any real profit to the shareholders? The total extension of railway lines in this country in the year 1882 is computed at 7335 kilcs., of which 4846 are open to traffic and 2488 in process of construction. The State lines, of which there are six, have now an extension of 2169 kilcs., 1332 being already open to traffic. Interest at the rate of 7 per cent. has been guaranteed on the capital expended in 17 of these undertakings in this country, the total capital guaranteed amounting to 177,903,000 milreis. In the estimates lately presented it has been calculated that 17,756,840 milreis are required for the construction and prolongation of lines during next year, and 8,985,263 milreis for guarantee of interest. Table No. 7 gives receipts and working expenses for the year 1882 of most of the lines in Brazil. Some of these lines show a deficit and others a balance of receipts over working expenses. This surplus, however, in many cases, is not sufficient to cover interest due on the capital guaranteed.

**GOLD NUGGETS IN AUSTRALIA.**—Big nuggets are still occasionally met with in New South Wales, as at Temora, where one was recently found weighing 173 ozs.

**DYNAMITE AND NITRO-COMPOUNDS.**—Although miners are now able to purchase dynamite, lithofracture, and the like somewhat cheaper than formerly, it appears that manufacturers of these explosives are still earning profits which cannot but be regarded as highly satisfactory. For example, the directors of Nobel's Explosives Company report that during the past year the manufacturing operations of the company at the Ardeer and Westquarter Factories have been conducted without accident or interruption, and the works, including machinery, buildings, tramways, and embankments have been maintained in a thoroughly efficient state. The cost of manufacturing nitro-glycerine, and hence of dynamite, was considerably less than during 1883, owing to a reduction in the price of glycerine, nitrate of soda, and sulphuric acid. The cost of fulminate of mercury and detonators has also been under that of the previous year. The capital expenditure during the past year has amounted to 21,582*l.* 9*s.* 6*d.*, and 9869*l.* 9*s.* 10*d.* has been written off in respect of renewals, repairs, and depreciation. The manufacture of blasting gelatine, for which the company hold the patent rights in this country and the British Colonies, and which was stopped in December,

1882, has been recommenced, and the company are now producing it in fair quantity. The directors anticipate an enlarged demand for this explosive, both in the home and foreign markets, and the extension and efficiency of the works will enable them to increase the production as required. The net profits for the year 1883, as shown by the profit and loss account, amount to 37,705*l.* 15*s.* 1*d.*, to which falls to be added the balance from 1882, 9824*l.* 15*s.* 3*d.*, in all 47,530*l.* 10*s.* 4*d.*. Out of this the directors recommend—1. That the sum of 32,000*l.* be appropriated to the payment of a dividend of 1*l.* 7*s.* 6*d.* per cent., free of income tax, and that the same be payable on May 1. —2. That the balance of 5530*l.* 10*s.* 4*d.* be carried forward to next year.

## THE AMALGAMATED SOCIETY OF ENGINEERS.

The thirty-third annual report of this society is being sent out this week to the various branches. The report is, as usual, a bulky volume of nearly 400 pages, and the general secretary, Mr. John Burnett, in his introduction, states that 1883 had, on the whole, been a good year for the society. It had brought with it its mixture of good and bad fortune, but he ventured to think that a brief review of their position would show that the good predominated over the bad. The year opened hopefully and well in nearly every department of trade, and for three-fourths of its course continued bright and prosperous. The demand for steam shipping had been unusually active, and to this fact their recent prosperity had been mainly due. But in the autumn this demand fell off almost entirely, and the shipbuilding trade underwent a remarkably sudden change—in fact, it went to the bad, in some districts, with almost the suddenness of a collapse. At no time during the year could the general trade of the country be said to be in a high state of prosperity, and in the engineering trades, therefore, they had, so far, been exceptionally fortunate in being so busy when other trades were comparatively depressed. To a large extent this had been due to the increased foreign trade done in their special productions, which had been 1,480,924*l.* in excess of the best year previously on record. But, in addition to this, the home demand for their productions had been almost equally as good. It was, therefore, easily to be seen that the employers had had better times of it than they ever had before, and, to some extent, this also applied to the men; but the 5 or 10 per cent. more wages they had gained bore but a small proportion to the general profits of the trade.

The returns from the various branches as to the state of employment showed that from the beginning of the year up to the month of May trade steadily improved, and at that date only 726 of their members were out of work through want of employment, which, with a single exception, was the lowest point their trade indicator had reached for many years. Turning to the progress made by the society during the past year, Mr. Burnett states that the branches had increased by four, and now numbered 424, distributed as follows:—In England, 305; Scotland, 41; Ireland, 14; Australia, 10; India, 1; New Zealand, 3; Queensland, 1; Canada, 6; Malta, 1; United States, 41; and France, 1. The number of members had increased from 48,388 at the close of 1882, to 50,418 at the close of 1883; the admissions had been 4265, and the exclusions 1431, the admissions being not quite so numerous as the exclusions, or a little higher than in 1882. The total income of the past year had been the second highest in their history, and amounted to 134,649*l.*, which was an increase of 10,241 over the previous year. Their expenditure had, however, also gone up considerably. In 1882 they spent but 102,165*l.*, but in 1883 their expenditure amounted to 124,724*l.*. This was an increase of 22,559*l.*, due chiefly to the decline of trade and the Sanderland dispute. Donation benefit had called for no less an amount than 31,211*l.*, which was 9275*l.* more than in 1882; contingent benefit had taken 3782*l.*, or 2922*l.* more than in the year of peace 1882, when it was only 860*l.*, and the great rise in the cost of this benefit was due to the Sanderland strike. Sick benefit had gone up to 26,436*l.*, which was 1141*l.* in excess of 1882, and 1744*l.* more than in 1881; the general benefit had also called for a larger sum, and rose to 8620*l.*, or 972*l.* more than in the previous year. The average age of their members at death was 45½ years, and the chief causes of mortality were lung, chest, and heart disease; after which came deaths from drowning. Superannuation benefit had again displayed an increasingly upward tendency, and had risen from 26,312*l.* in 1882, to 28,496*l.* last year. Accident benefit, which showed a slight decrease, had amounted to 1500*l.*, and the sum expended for branch offices, and committees, and district committees was 2618*l.*. Grants from the special funds, raised by levy, had risen considerably on account of falling trade and the great dispute at Sanderland on the apprentice question. Benevolent grants had absorbed 2259*l.*, or 328*l.* more than in 1882, and grants to their own and other trades had been made to the amount of 4633*l.*, an expenditure which was also chargeable to the long-standing dispute at Sanderland. Summing up the numerical and financial position of the society, the general secretary says he may state that they had now 50,418 members enrolled in 424 branches, which were situated in every quarter of the globe, penetrating even into countries in which the English tongue was not spoken. Their total income for the year was 134,649*l.*, and their total outlay 124,724*l.*, leaving a balance in their favour of 9925*l.*, which, added to their previous cash in hand, made a total sum in the possession of the society of 178,125*l.*, or an average value of 3*l.* 10*s.* 7*d.* per member. In conclusion, Mr. Burnett adds that 1883 had come and gone, and they had not only held their own in their greatest trade struggle of the last 10 years, but they had saved nearly 10,000*l.*, and had it not been for that struggle they would probably have doubled their savings for the year.

**BUILDING SOCIETIES IN AUSTRALIA.**—There are in Sydney, the metropolis of New South Wales, between 20 and 30 land and building societies, with share capital ranging from 2000 to over 260,000*l.*. The members belong principally to the labouring and small shop-keeping classes, many of whom are the owners of the house in which they reside and the land on which they are built. The share capital of the various societies amounts in round figures to nearly a million sterling. The deposits amount to about another million. The borrowers are charged about 8 per cent. on the amount of their loans, this being regarded as fair, being the same as 5 per cent. in England. The advances made during the past year reached nearly three-quarters of a million. The whole of the money thus borrowed was for the purpose of investing in land or house property, and it is estimated to average about 12*l.* per head of the wage-earning community. There are also building societies at Goulburn, Maitland, and other parts of the colony. As a rule the societies are permanent, very few being based on the terminating principle.

**ELECTRIC LIGHTING.**—The interesting lecture, "The Electric Light in our Homes," by Mr. ROBERT HAMMOND, was delivered at St. James's Hall on Wednesday. He gave many practical examples of the simplicity of the working of the incandescent lamp, the light from which is of course entirely free from any deleterious results of combustion. On the question of safety the lecturer explained that for domestic purposes low tension only would be required. Although a shock from the wire at low tension would not be dangerous the precaution of protecting the wire would be taken; while the great heat would be guarded against by the introduction of lead safety fuses. By these means the lighting would be rendered perfectly secure. Electric lights, it was shown, could not only be put out singly on a pendant with several lights, but could be readily turned down to a low power. With respect to cost, it was tacitly admitted that until the work of electric lighting of domestic homes can be done on a large scale, as is done by the gas companies, the expense will be greater than that of gas.

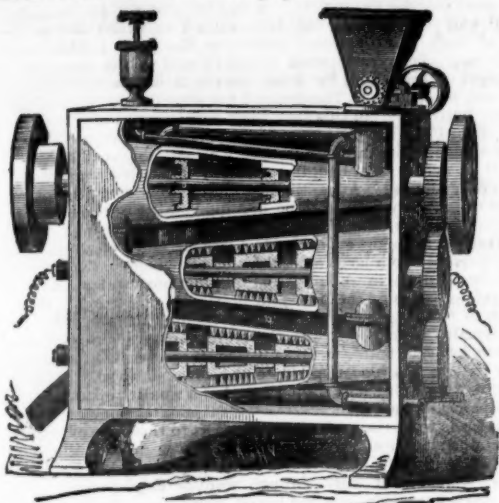
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## NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never needs stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamo machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.  
2.—The loss being less than 10 per cent.  
3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.  
By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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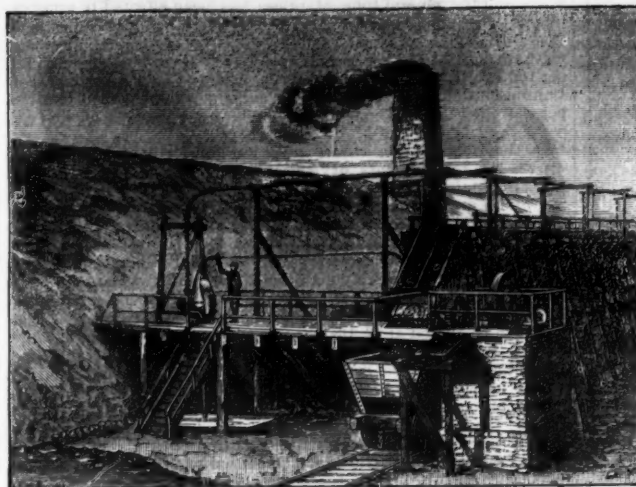
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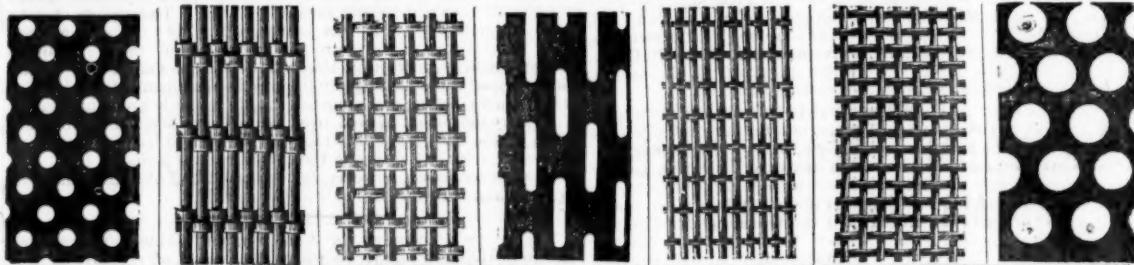
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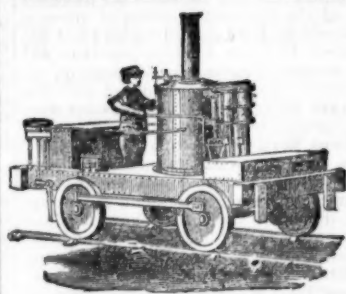
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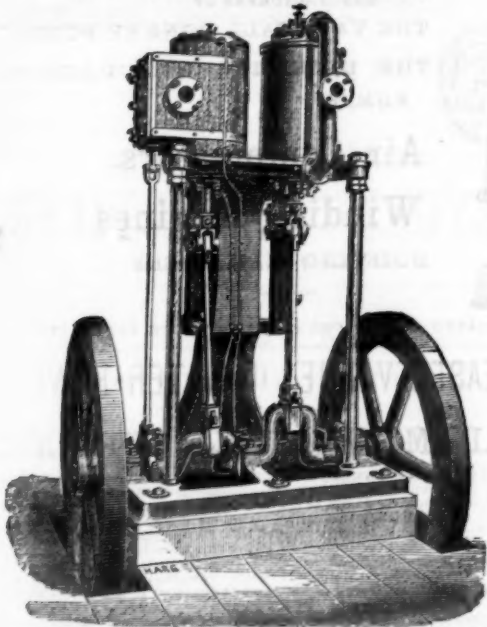
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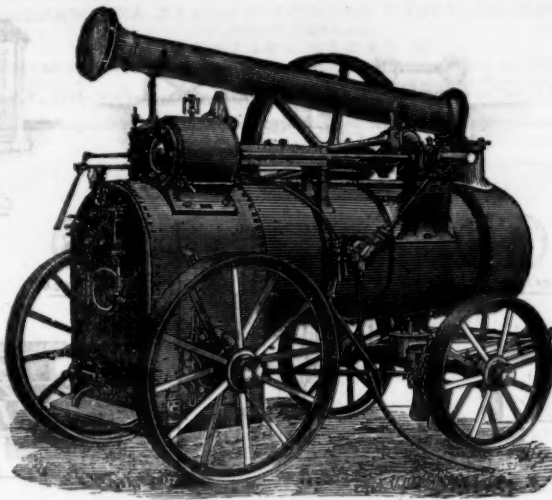
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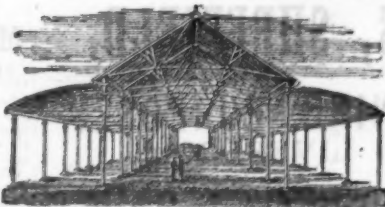
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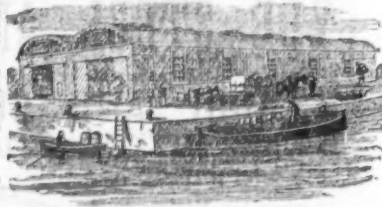
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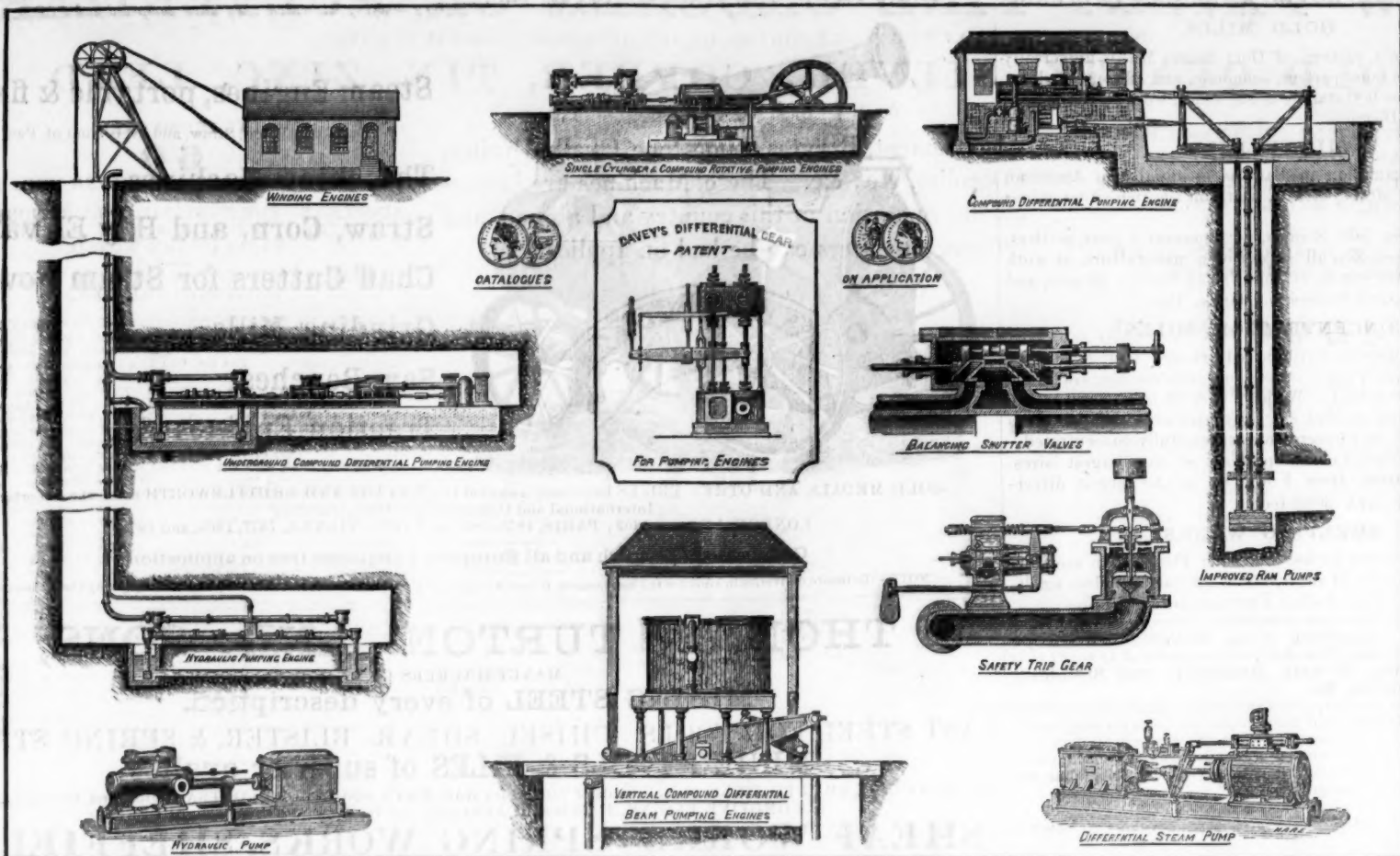
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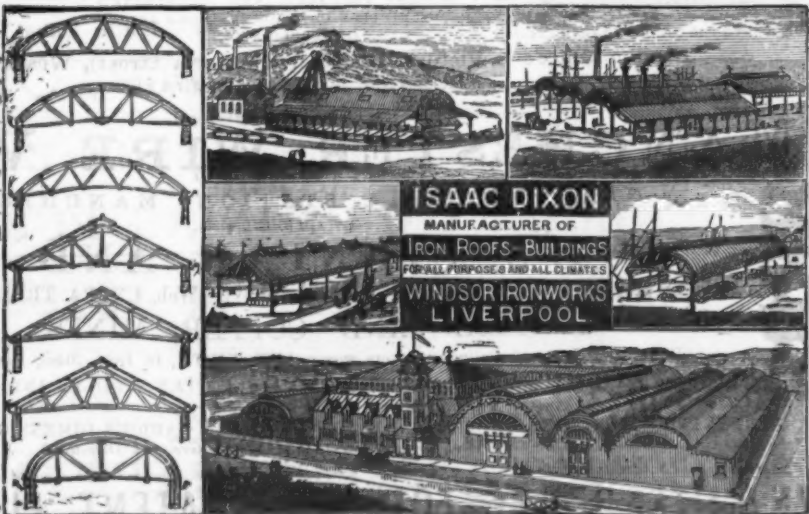
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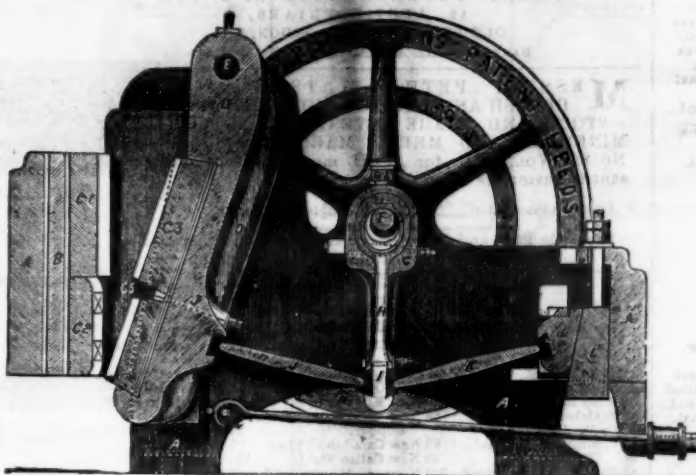
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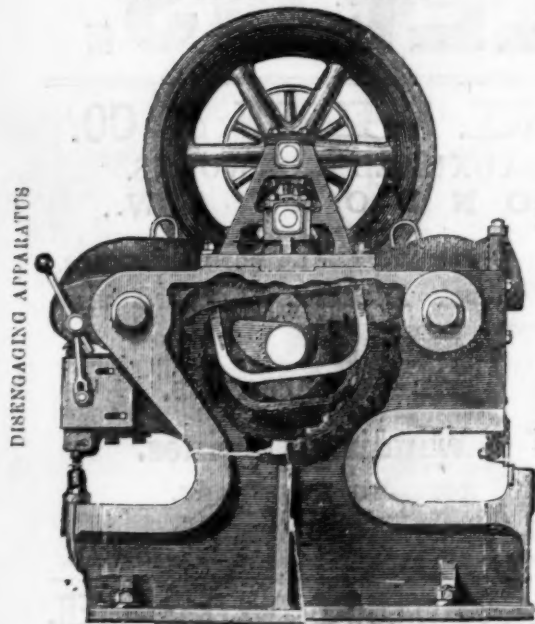
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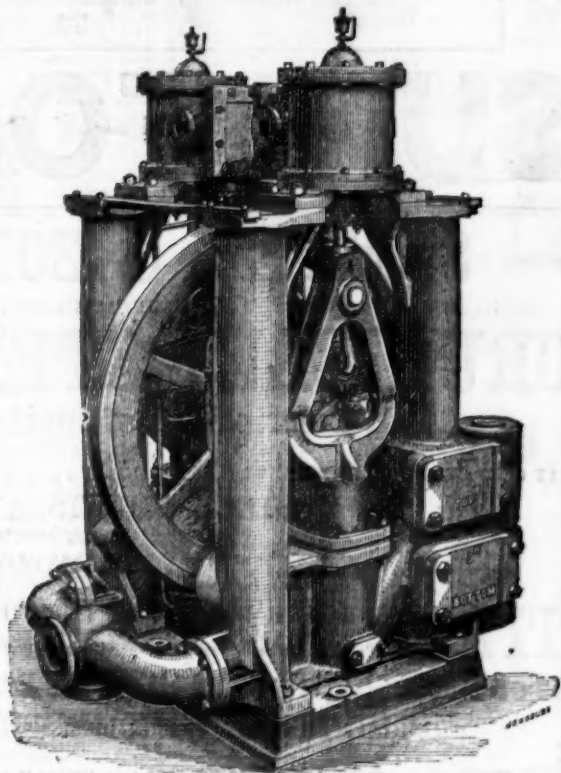
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